Texas A&M University
Core Curriculum
Initial Request for a Course Addition to the Fall 2014 Core Curriculum

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?

PHIL 240 (Introduction to Logic) focuses on quantitative literacy through the study of deductive and inductive arguments. It requires the mastery of Venn diagrams, truth tables, formal deductive systems, and the probability calculus, all of which contribute dramatically to quantitative literacy in logic, patterns, and relationships. Key mathematical concepts include validity, inference, deduction, Boolean logic, predicate logic, the probability calculus, and Bayes theorem. Logic improves everyday experience by enabling students to evaluate and manipulate data and to build and understand deductive and inductive arguments. These basic skills are useful to understanding modern computer systems, in succeeding on standardized tests, and in the everyday work of many professions including law, medicine, military, engineering, politics, business, marketing, journalism, environmental science, and social science.

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 evaluated through quizzes and three exams:

Students will evaluate arguments for the presence of logical ambiguities and other imprecision.
Students will analyze sentences and arguments for their logical form.
Students will create valid deductive arguments and inductive arguments of varying strengths.
Students will make use of innovative methods in logic to synthesize information and represent it in diagrams, tables, formal languages, and numerically.
Students will analyze arguments in order to assess validity and identify logical fallacies.
Students will inquire into the relationship between numerical expressions of probability and appropriate strength of belief and use Bayes’ Theorem to evaluate claims about that relationship.
Students will, through the evaluation of argument validity through the truth table method, distinguish processes that are genuinely algorithmic from those that involve chance or independent decisions.
Students will inquire into different forms of arguments in order to distinguish between inductive and deductive reasoning.

Communication (to include effective development, interpretation and expression of ideas through written, oral and visual communication):
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The following communication skills will be evaluated through quizzes, three exams, lecture and discussion section:

Students will develop ideas by clarifying arguments through the identification and rectification of logical ambiguity.
Students will express information in a variety of written and visual formats, including diagrams, tables, and written symbolic notation.
Students will interpret natural argument and given data in order to produce arguments based upon it.
Students will understand data presented in visual forms in truth tables and Venn diagrams and be able to express data in those forms.
Students will explain ambiguity, fallacy, validity, induction and deduction.
Students will write clear inductive and deductive arguments.

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 evaluated through quizzes and three exams:

Students will manipulate observable facts to build clear deductive arguments
Students will manipulate numerical data to build clear inductive arguments.
Students will employ the probability calculus in the analysis of numerical data in order to arrive at informed conclusions about the comparative probability of given events, e.g., the probability of drawing a straight versus a full house in a game of poker.
Students will calculate the conditional probability CP(H,E) of a given hypothesis, H, given a body of data or evidence, E as that ratio of P(H&E)/P(E) (e.g., the probability that a random person died on a certain date given that he was a senior) in order to come to informed conclusions about probabilities.
Students will calculate the conditional probability CP(H,E) of H given evidence E by means of Bayes’ Theorem in terms of its prior probability P(H), the probability of E given H, CP(E,H) and the probability of not-E given H, CP(~E,H) (e.g., the probability that a patient has a certain illness given she has tested positive for it) in order to come to informed conclusions about the implications of statistical data.
Students will analyze data by dynamically updating the conditional probability of a given hypothesis in light of new evidence by means of Bayes’ Theorem.

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