Catalog Description
Basic set theory and symbolic logic. Methods of proofs, including mathematical induction. Relations, functions, and partitions; modular arithmetic.

Course Objectives
To develop logical thinking and its application to computer science (to emphasize the importance of proving statements correctly and de-emphasize the hand-waving approach towards correctness of an argument). The subject enhances one’s ability to reason and ability to present a coherent and mathematically accurate argument. About 40% of the course time will be spent on logic and proofs and remaining 60% of the course time will be devoted to functions, relations, etc.

Prerequisites
PHI 251 and MAT 295

Course Outcomes
After completing this course satisfactorily, a student will:

- Be able to construct simple mathematical proofs and possess the ability to verify them ABET[ (a, j)].
- Have substantial experience to comprehend formal logical arguments ABET[ (a, b, c)].
- Be skillful in expressing mathematical properties formally via the formal language of propositional logic and predicate logic ABET[ (a)].
- Be able to specify and manipulate basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess ABET[ (a)].
- Acquire ability to describe computer programs (e.g. recursive functions) in a formal mathematical manner ABET[ (a, c, i, j)]
- Be able to apply basic counting techniques to solve combinatorial problems ABET[ (a)].
- Gain experience in using various techniques of mathematical induction (weak, strong and structural induction) to prove simple mathematical properties of a variety of discrete structures ABET[ (a, c, j)].

Outcome Measurement
The course outcomes will be mainly measured via in-class exams, homeworks, quizzes. In addition, lab assignments to restress mathematical concept will be used.

Course Topics
Elementary set theory covering basic definitions and set operations, including the power set and Cartesian products; basic connectives in prepositional logic and their properties with emphasis on some of the methods of proving mathematical results; the role of quantifiers in predicate logic and in infinitely large domain sets; mathematical induction; binary relations and, in particular, the equivalence relation; partial order relations; the concept of function in its abstract form; role and use of the pigeonhole principle; growth rates of curves; induced function.
CAC Category Content

0.5 Data Structures
0.5 Algorithms
  Software Design
  Computer Organization & Architecture
  Programming Languages