

# WEBSTER UNIVERSITY

## COURSE SYLLABUS

MTHC 5130.01

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PROBABILITY and GRAPHS

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### 1. **Course Description**

This course is designed to introduce middle school teachers to probability, with a focus on analysis of games, and to topics in Discrete Mathematics, including graphs, trees, and Finite State Machines.

### 2. **Learning Outcomes:**

Students will:

- have experience in applying the concepts of probability to a variety of situations- many of which pertain to games and gambling;
- learn how to analyze normally distributed test scores, given the mean and standard deviation
- learn some elementary, but charming applications of Discrete Mathematics;
- observe methods for presenting these concepts to middle school children

### 3. **Schedule; The following schedule is approximate, and will vary according to student interests and tempo. There will be a homework each week pertaining to ideas discussed in class.**

**CLASS 1:** Finite state machines; Applications to the design of credit card machines.

**CLASS 2:** Chromatic numbers along with their application to a variety of problems pertaining to transporting incompatible chemicals, making up exam schedules for a school, etc.

**CLASSES 3-4:** Graphs; The bridge of Konigsberg; Path Problems; Representation Matrices Applications.

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**CLASSES 5-6:** Trees; Binary trees; Huffman codes; Designing secret codes; Using a binary search to search binary trees for stored information.

**CLASS 7:** Quiz; Polish and Reverse Polish Notation for expressing arithmetic and algebraic expressions.

**CLASSES 8-9:** Expected Value; Analyzing games using expected value.

**CLASS 10:** Analysis of roulette, craps, and chuck-a-luck;

**CLASS 11** Counting Techniques; Quiz

**CLASSES 12-13** Pascal's triangle; Applications of probability to a variety of empirical situations.

**CLASSES 14-15:** Basic concepts of descriptive Statistics; Analyzing test scores; Paradoxes in Probability

**CLASS 16:** Quiz

4. **RESOURCES:** The instructor will distribute relevant materials

5. **EVALUATION:** Based primarily on the quizzes, and, to a lesser extent, class participation.

**This syllabus is subject to change at the discretion of the instructor. Therefore, regular attendance is required.**