**CSCI 190 OUTLINE**

DISCRETE MATHEMATICS APPLIED TO COMPUTER SCIENCE

TEXT: Discrete Mathematics and Its Applications 8th Edition, Ken Rosen (2019)

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| **Topics** | **Sections** | **Time** |
| Truth tables, tautologies, the fundamental theorem of propositional calculus. Predicates and quantifiers. Satisfiability, models. Rules of inference. Methods of proofs. | 1.1 - 1.7 | 7 Hours |
| Sets and set operations, characteristic functions, cardinality, countable sets. Functions, bijections. Sequences and summation. | 2.1 - 2.4 | 5 Hours |
| Algorithms, growth of function, complexity of algorithms. Integers, factorization. The Euclidian algorithm. Applications of number theory to encryption. Matrices and matrix arithmetic, coordinates, similarity.\* | 3.1 - 3.84.1-4.5 | 6 Hours |
| Mathematical induction. Recursive definitions. Recursive algorithms. Program correctness. | 5.1-5.6 | 6 Hours |
| Basics of counting, sum rule, product rule, tree diagrams. Permutations, combinations, the Pigeonhole Principle. Binomial coefficients and the Binomial theorem. Pascal's triangle. Discrete probability. Expected value and variance. Bayes' Theorem.\*\* | 6.1 -6.4, .3\*\*7.1-7.6  | 7 Hours |
| Advanced counting techniques. Recurrence relations, solving recurrence relations. Divide and conquer relations. Inclusion-Exclusion and applications. Relations, n-ary relations, equivalence relations, partial orderings. | 8.1 - 8.69.1-9.8 | 6 Hours |
| Graphs: introduction and terminology. Connected graphs, Eulerian path, Hamiltonian cycles, shortest path problems, planar graphs, graph coloring. Trees and their applications, tre traversals, spanning trees, minimum spanning trees. | 10.1 - 10.511.1-11.4 | 7 Hours |
| Boolean algebra, boolean functions and logical gates. Languages and grammars. Finite state machines. Turing machines. | 12.1 - 12.513.1-13.4 | 7 Hours |

\* Supplemental handout

\*\* Optional

Submitted by: Pop

* This outline allows for 4 hours review and exams.

Math Department Policy can be found at: https://mtsac.instructure.com/courses/33990/files?pr

Notes:

* 1 hour = 1 hour of face time

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