Enumerative combinatorics is a collection of techniques for enumerating a set of objects (saying how many there are) without listing all the possibilities. Combinatorial techniques are often applied to questions of probability in situations when all outcomes are equally likely. For example, in a game of poker, any combination of five cards is equally likely to be dealt from a well-shuffled deck. What is the probability that any particular set of five cards form a full house (three of one rank and two of another)? To answer this question, we divide the number of full-house combinations by the total number of five-card combinations. To obtain these two numbers without listing all the possibilities, we use combinatorics. Although combinatorial problems can often be stated in the language of puzzles and games, the results have applications throughout mathematics, both pure and applied. Topics include: the pigeon-hole principle, mathematical induction, permutations and combinations, binomial identities, partitions, the principle of inclusion and exclusion, recurrence relations, generating functions, and possibly some graph theory. Prerequisite: Linear Algebra.