UNIVERSITY OF NEBRASKA AT OMAHA

MATH/CSCI 3100/8105: Applied Combinatorics

TR 5:30 PM – 6:45 PM | DSC 164 | Dr. Dora Velcsov

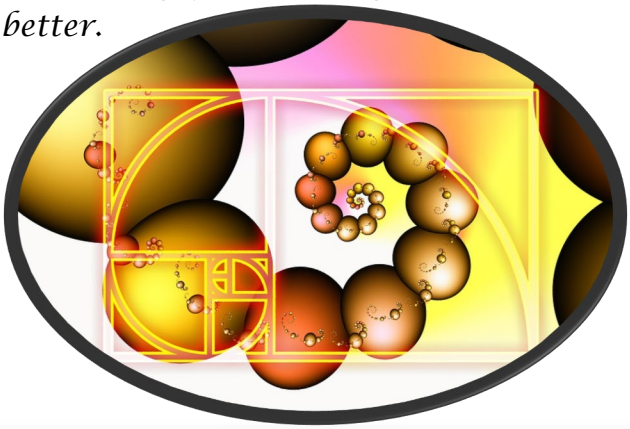
Description: *A basic goal of this course is to introduce students to combinatorial reasoning. Problems in counting, or enumeration, require a careful analysis of structure (for example, whether or not order and repetition are relevant) and logical possibilities.*

There are a variety of applications whose solutions lend themselves to iterative procedures that lead to specific algorithms. See image to the right and the example.

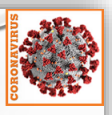
It is possible to establish results by counting a certain collection of objects in more than one way. This provides combinatorial identities and introduces a different proof technique.

The course will cover some or all of the following topics: basic counting methods, generating functions, recurrence relations, principle of inclusion-exclusion. Polya's formula. elements of graph theory, trees and searching network algorithms.

Pre-requisites: *MATH 2030, MATH 2040, MATH 2230, or CSCI 2030 all with a C- or better.*



THE CORONA EXAMPLE (APPLIED COMBINATORICS)



If a first case of a virus infection is recorded in a certain school system, let p(n) denote the probability that at least one case is reported during the n-th week (day?) after the first recorded case. (Reliable) school records provide evidence that

$$p(n) = p(n-1) - (0.25)p(n-2),\ n >= 2.$$

Since p(0) = 0 and p(1) = 1, if the first case is recorded on March 1st (2020?), when will the probability for the occurrence of a new case decrease to less than 0.01 for the first time?

Very fine print: The first student who submits a correct answer (with proof) will pass the class with an A+ and without a final exam. (But… you do know I am a liar.)

For More Information:
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