Salisbury University Department of Mathematical Sciences

MATH 490 :   Special Topics: Combinatorics
Syllabus (Tentative)

Description: Enables study in specialized areas such as complex variables, logic, non-Euclidean geometry or other topics suggested by faculty or students. 4 Hours Credit: Meets four hours per week.

Prerequisites: This course requires a C or better in MATH 306.

Intended Audience: Junior- and senior-level mathematics and computer science majors

Objective: To introduce students to enumerative and bijective combinatorics.

Textbooks: *Bijective Combinatorics*, by Nicholas A. Loehr, CRC Press, ISBN 978-1439848845

Technology: Mathematica and other programing languages as appropriate

Topic	Weeks
Basic Counting	2
Preliminaries, the product rule, the sum rule, and elementary counting techniques on discrete objects.	
Combinatorial Identities and Recursions	3
Introduction to combinatorial proofs, binomial theorem, multinomial theorem, recursions for multisets, anagrams, lattice paths, Catalan recursion, integer partitions, and Stirling numbers.	
Counting Problems in Graph Theory	3
Graphs, digraphs, walks, matrices, counting rooted trees, counting trees, graph coloring, and Eulerian tours.	
Inclusion-Exclusion, Involutions, and Möbius Inversion	3
The inclusion-exclusion formula, surjections and Stirling numbers, Euler's Φ function, derangements, involutions, and Möbius Inversion.	
Generating Functions	3
Convergence of power series, operations on power series, solving recursions with power series, and other applications of power series.	
Total	**14**

Evaluation

Homework	80%
Presentations	20%

- Clear descriptions of thought processes, evidence of critical thinking, and effective communication must be demonstrated in written work.

- **Writing Across the Curriculum:** Students will be expected to communicate mathematics and mathematical ideas effectively in speech and writing. At the University Writing Center, trained consultants are ready to help you at any stage of the writing process. In addition to the important writing instruction that occurs in the classroom and during professors' office hours, the Center offers another site for learning about writing. **All students are encouraged to make use of these important services.**

- **NOTE:** Once a student has received credit, including transfer credit, for a course, credit may not be received for any course with material that is equivalent to it or is a prerequisite for it.