

# DMNS FAIR

Queens College, City University of New York  
Division of Mathematics and Natural Sciences  
Faculty Achievement In Research

**MY NAME:** Christopher Hanusa

**MY DEPARTMENT:** Mathematics

**SOMETHING INTERESTING ABOUT ME:**

When I create a list of examples, I must have either one or at least three, never two. Moreover, I enjoy typesetting. Also, I learned how to juggle in college.

**MY RESEARCH:**

My primary research interest is in a field of mathematics called **algebraic combinatorics**. Combinatorics is the study of counting, intelligently. For example, a simplified version of my doctoral thesis would ask "**In how many ways are there to tile a chessboard with 32 non-overlapping dominoes?**"

The answer to this question is **12,988,816**. While this number is the **correct** answer, it does not give any insight into the problem or how one would solve a more general version of the problem. In fact, one can use methods of graph theory and linear algebra to find this number as the determinant of a matrix; exploring further allows for calculation of a formula for the number of tilings of an  $m \times n$  board.

My current research has an algebraic flavor; I am working to develop the theory of certain combinatorial objects called *core partitions* and *abacus diagrams*, which would give researchers in Algebra who study Coxeter groups a better way to understand the elements of these groups.

A secondary interest is **multidisciplinary research**. I have worked in theoretical chemistry studying Madelung constants (with QC's Dave Baker), in political science studying voting theory as well as the game theory of autocratic rulers, and I have a planned project in risk management (with QC's Diane Coogan).

If you plan to implement a mathematical model or need a mathematical collaborator, keep me in mind.

1	2	3	4	5	6
-20	-19	-18	-17	-16	-15
-13	-12	-11	-10	-9	-8
-6	-5	-4	-3	-2	-1
1	2	3	4	5	6
8	9	10	11	12	13
15	16	17	18	19	20
22	23	24	25	26	27

0	1	2	3	2	1	0
1	0	1	2	3	2	
2	1	0	1	2		
3	2	1	0			
2	3	2				
1	2					
0						

**MY RESEARCH IN 140 CHARACTERS:**

My research is in algebraic combinatorics, exploring discrete objects to solve questions from algebra. Also: multidisciplinary projects!!!!  
(verified on twitter)