



**KENNESAW STATE**  
**UNIVERSITY**

COLLEGE OF SCIENCE AND MATHEMATICS

*Department of Mathematics*

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# Discrete Mathematics Seminar<sup>1</sup>

Friday, April 2, 2021

2:30–3:30pm (Microsoft Teams)

Title: *Determinantal formulas with major indices*

Speaker: Dr. Thomas McConville, Assistant Professor, Department  
of Mathematics, Kennesaw State University

ABSTRACT: Krattenthaler and Thibon discovered a beautiful formula for the determinant of the matrix indexed by permutations whose entries are  $q^{\text{maj}(w^{-1})}$ , where “maj” is the major index. Previous proofs of this identity have applied the theory of nonsymmetric functions or the representation theory of the Tits algebra to determine the eigenvalues of the matrix. I will present a new, more elementary proof of the determinantal formula. Then I will explain how we used this method to prove several conjectures by Krattenthaler for variations of the major index over signed permutations and colored permutations. This is based on joint work with Donald Robertson and Clifford Smyth.

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<sup>1</sup>The Discrete Mathematics Seminar (DMS) is intended for Kennesaw State faculty working in the various areas of algebra, number theory, and discrete mathematics to get together to discuss their current work or related questions. Seminars often involve advanced mathematical knowledge. However, the seminars are open to anyone who is interested in attending.