Math 610 - Topics in Algebra: Symmetric Functions - Fall 2014

Course Goals:

We will cover the classical bases for the ring of symmetric functions along with the associated combinatorics. We will also provide applications to representation theory (classical groups) and algebraic geometry (Schubert calculus).

Lecturer:

Professor Sami Assaf
Office: KAP 438 C
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Lectures: TBD
Office Hours: TBD

Course Text:

Macdonald. *Symmetric functions and Hall polynomials.* Second edition. Oxford University Press Inc., 1995.
Stanley. *Enumerative Combinatorics, Vol 2.* Cambridge University Press, 1999.

Course Topics:

1. Partitions and the ring of symmetric functions
2. Monomial, elementary, and complete homogeneous symmetric functions
3. Power sum symmetric functions, an involution, and the Hall innner product
4. Schur functions three ways
5. Jacobi–Trudi identity, transition matrices
6. RSK algorithm, characters of symmetric groups
7. Pieri rule, Littlewood–Richardson rule
8. Knuth equivalence, dual equivalence, jeu de taquin
9. Quasisymmetric functions and dual equivalence graphs
10. Hall–Littlewood polynomials
11. (¡i¿guest lectures¡/i¿)
12. Schur Q-functions, k-Schur functions
13. LLT polynomials, Macdonald polynomials
14. Thanksgiving
15. Schubert polynomials

Grading:

Grades will be based on weekly problem sets.