Curriculum Vitae of Alexander Yong

Employment:

2008-Present	*University of Illinois at Urbana-Champaign* Assistant Professor in Mathematics
2005-2008	*University of Minnesota, Minneapolis* Dunham Jackson Assistant Professor in Mathematics
2003-2005	*University of California, Berkeley* Visiting Assistant Professor in Mathematics

Education:

1999–2003	*University of Michigan at Ann Arbor* Ph.D. in Mathematics, May 2003 Thesis advisor: Sergey Fomin
1998–1999	*University of Waterloo,* Canada M.Math. in Combinatorics and Optimization, August 1999 Academic advisor: Ian Goulden
1994–1998	*University of Waterloo,* Canada B.Math., double honors in Pure Mathematics and Combinatorics and Optimization, April 1998

Research Interests:

Combinatorics, its applications, and its interactions with other areas of mathematics, including algebraic geometry, commutative algebra, representation theory, probability theory, and algorithms

Academic Honors and Awards:

2006-2009	NSF support (DMS 0601010 award amount: $268,000); co-PI (PI: Victor Reiner)
2006-2007	Digital Technology Center grant, U. Minnesota (award amount: $24,671); co-PI with David Redish (PI: Duane Nykamp)
January 2005	NSERC Postdoctoral Fellowship (held at the Fields Institute, U. Toronto)
2002	Rackham Dissertation fellowship, U. Michigan
1998-1999	NSERC PGS A fellowship for graduate studies
1998	K.D. Fryer Gold Medal, awarded at convocation, U. Waterloo

1994–1998	Descartes Mathematics Fellowship, U. Waterloo
1994–1998	Canada Scholarship (national award for undergraduate studies)

Teaching Experience:

2005-Present	Instructor, University of Minnesota, Minneapolis: Undergraduate courses in *Differential equations and linear algebra* (course coordinator), and *Enumerative combinatorics* Graduate course in *Combinatorics*
2003–2005	Instructor, University of California, Berkeley: Upper division courses in *Abstract Algebra, Combinatorics* ($\times 2$), *Complex Analysis, Real Analysis.*
1999–2003	Instructor, University of Michigan: Lower division courses in *Calculus II, Calculus I, Precalculus.*
1995–1999	Teaching Assistant, University of Waterloo; Courses: *Linear Algebra II, Linear Algebra I, Classical Algebra* *Combinatorics for Engineers, Combinatorics I,* *History of Mathematics, Business Law.*

Other Professional Activities:

Referee work	Advances in Math, Transactions of the A.M.S., Proceedings of the A. M. S, Pure and Applied Math Quarterly, Journal of Algebraic Combinatorics, Journal of Combinatorial Theory, European Journal of Combinatorics Discrete Math, Journal of Algebra, Electronic Journal of Combinatorics, Springer Books
April 2009	Co-organizer of Urbana AMS Special session on "Algebra, geometry and combinatorics" (with Rinat Kedem)
October 2007	Referee for proposed scientific program at the Banff International Research Station
July 2006	Co-organizer of the Fields Institute "Workshop on computational and combinatorial commutative algebra" (with Greg Smith and Ragnar-Olaf Buchweitz)
April 2006	Co-organizer of the San Francisco AMS Special session on "Geometry of Gröbner bases" (with Bernd Sturmfels)
2005-2008	Co-organizer of the U. Minnesota Combinatorics Seminar

	(with Victor Reiner)
2005-2008	Co-organizer of the U. Minnesota Algebraic geometry Seminar (with Ionut Ciocan–Fontanine)
June 2005	Co-organizer of the Fields Institute "Workshop on Schubert calculus" (with Megumi Harada, Lisa Jeffrey and Alistair Savage)
April 2005	Co-organizer of the Santa Barbara AMS Special session on "Algebraic geometry and combinatorics" (with Allen Knutson)
2004-2005	Co-organizer of the UC Berkeley Combinatorics Seminar (with Alexander Woo)
October 2005	Local organizer (90+ participants) of the "Bay Area Discrete Math Day"
Jan. -April 2003	Research assistant for A. Barvinok, studying "Random weighting and asymptotic counting"
Jan. - April 2001	Proofreader for a book on Convex Analysis, written by A. Barvinok
2001 -2003	Lecturer for the King-Chavez-Parks mathematics program for disadvantaged youths
October 2001	Lecturer for the Undergraduate Math Club, U. Michigan
2000-2001	Research assistant for P. Hanlon, studying the optimization of cache misses in matrix multiplication

Talks (Selected):

January 2008	Colloquium, University of Oregon, Eugene "Schubert combinatorics and geometry"
January 2008	Colloquium, Texas A+M University, College Station "Schubert combinatorics and geometry"
January 2008	Colloquium, Georgia Institute of Technology, Atlanta "Schubert combinatorics and geometry"
January 2008	Colloquium, University of Pittsburgh, Pittsburgh "Schubert combinatorics and geometry"
December 2007	Colloquium, University of Illinois, Urbana-Champaign "Schubert combinatorics and geometry"
May 2007	*Workshop on algebraic geometry and algebraic combinatorics*, CRM, Montreal

"Schubert combinatorics and geometry"

March 2007 — *Workshop on Schubert calculus and varieties*, Banff research station, Banff
"Governing singularities of Schubert varieties"

October 2006 — *Combinatorics seminar*, M. I. T., Cambridge
"A combinatorial rule for (co)minuscule Schubert calculus"

October 2006 — *Geometry, representation theory and combinatorics seminar*, UC Berkeley, Berkeley
"A combinatorial rule for (co)minuscule Schubert calculus"

August 2005 — *AMS "every decade" conference on Algebraic geometry*, Seattle
"On smoothness and Gorensteinness of Schubert varieties"

February 2005 — *Algebraic geometry seminar*, University of Michigan, Ann Arbor
"On smoothness and Gorensteinness of Schubert varieties"

February 2005 — *Special Combinatorics seminar*, UC San Diego, San Diego
"When is a Schubert variety Gorenstein?"

January 2005 — *Symplectic geometry seminar*, University of Toronto, Toronto
"Enumerative formulas in Schubert calculus"

November 2004 — *Geometry, representation theory and combinatorics seminar*, UC Berkeley, Berkeley
"When is a Schubert variety Gorenstein?"

July 2004 — *Park City Mathematics Institute Geometric Combinatorics Workshop*, Park City, Utah
"Gröbner geometry of geometric vertex decompositions"

May 2004 — *Bay Area Discrete Math Day,* Stanford University, Stanford
"Gröbner degeneration, Schur polynomials and positivity"

April 2004 — *Commutative algebra seminar,* UC Berkeley, Berkeley
"Gröbner degeneration, Schur polynomials and positivity"

January 2004 — *Pure Math Colloquium,* University of Waterloo, Canada
"Degeneracy loci, Quiver coefficients and Schubert calculus"

October 2003 — *Algebraic Geometry Seminar,* Stanford University, Stanford
"Degeneracy loci, Quiver coefficients and Schubert calculus"

June 2003 — *Conference on Formal Power Series and Algebraic Combinatorics*, Vastana, Sweden
"Schubert polynomials and quiver formulas"

October 2002	*Special session on Modern Schubert Calculus*, AMS Eastern Section meeting, Boston "Schubert class formulas"
October 2002	*Combinatorics Seminar*, M. I. T., Cambridge "Schubert polynomials and Quiver formulas"
July 2002	*Conference on Formal Power Series and Algebraic Combinatorics*, Melbourne, Australia "Degree bounds in quantum Schubert calculus"

Institutes Visited (Selected):

March 2007	Banff Conference center, Banff, Canada.
March-June 2006	Institute for Pure and Applied mathematics, Los Angeles.
April-May 2005	Mittag-Leffler Institute, Stockholm, Sweden.
May-June 2002	Le Centre de Recherches Mathematiques, Montreal, Canada.
June-July 2001	Isaac Newton Institute, Cambridge, U.K.
May-June 2001	Fields Institute, Toronto, Canada
August 2000	Mathematical Sciences Research Institute, Berkeley

Research papers and preprints

1. An approximation algorithm for contingency tables (with Alexander Barvinok, Zur Luria, Alex Samorodnitsky), preprint, 2008. arxiv:0803.3948

2. Longest strictly increasing subsequences, Plancherel measure, and the Hecke insertion algorithm (with Hugh Thomas, and an appendix with Ofer Zeitouni), preprint, 2008. arxiv:0801.1319

3. A jeu de taquin theory for increasing tableaux, with applications to K-theoretic Schubert calculus (with Hugh Thomas), preprint, 2007. arxiv:0705.2915.

4. An S_3-symmetric Littlewood-Richardson rule (with Hugh Thomas), *Mathematical Research Letters*, to appear, 2008. arxiv:0704.0817

5. Counting magic squares in quasi-polynomial time (with Alexander Barvinok and Alex Samorodnitsky), preprint, 2007. arxiv:math.CO/0703227

6. Cominuscule tableau combinatorics (with Hugh Thomas), preprint, 2007. arxiv:math.CO/0701215

7. A combinatorial rule for (co)minuscule Schubert calculus (with Hugh Thomas), accepted to *Advances in Math* pending minor revisions, 2007. arxiv:math.AG/0608276

8. Governing singularities of Schubert varieties (with Alexander Woo), *Journal of Algebra* (Section of Computational Algebra), accepted, 2007. arXiv:math.AG/0603273

9. Stable Grothendieck polynomials and K-theoretic factor sequences (with Anders Buch, Andrew Kresch, Mark Shimozono and Harry Tamvakis), *Mathematische Annalen*, to appear, 2007. arXiv:math.AG/0601514

10. Multiplicity-free Schubert calculus (with Hugh Thomas), *Canadian Bulletin of Math.*, to appear, 2007. arXiv:math.CO/0511537

11. Tableau complexes (with Allen Knutson and Ezra Miller), *Israel Journal of Math*, to appear, 2006. arXiv:math.CO/0510487

12. Gröbner geometry of geometric vertex decompositions, and of flagged tableaux (with Allen Knutson and Ezra Miller), *Journal für die reine und angewandte Mathematik (Crelle's journal)*, to appear, 2007. arXiv:math.AG/0502144

13. When is a Schubert variety Gorenstein? (with Alexander Woo), *Advances in Math*, to appear. arXiv:math.AG/0409490

14. A formula for K-theory truncation Schubert calculus (with Allen Knutson), *International Mathematics Research Notices* **70** (2004), 3741–3756.

15. Quiver coefficients are Schubert structure constants (with Anders Buch and Frank Sottile), *Mathematical Research Letters*, **12** (2005), no. 4, 567–574.

16. Grothendieck polynomials and quiver formulas (with Anders Buch, Andrew Kresch and Harry Tamvakis), *American Journal of Mathematics*, **127** (2005), 551–567.

17. On combinatorics of quiver component formulas, *Journal of Algebraic Combinatorics*, **21**(2005), 351–371.

18. Schubert polynomials and Quiver formulas (with Anders Buch, Andrew Kresch and Harry Tamvakis): *Duke Mathematical Journal* **122** (2004), no. 1, 125–143.

19. Degree bounds in quantum Schubert calculus: *Proceedings of the American Mathematical Society*, **12** (2003), no. 9, 2649–2655.

20. Tree-like properties of cycle factorizations (with Ian Goulden): *Journal of Combinatorial Theory, Ser. A*, **98** (2002), no. 1, 106–117.

21. Dyck paths and a bijection for multisets of hook numbers (with Ian Goulden): *Discrete Math*, **254** (2002), no. 1-3, 153-164.

In preparation

22. Coalescent theory with ecological interactions (tentative title), (with Nicholas Lanchier and Claudia Neuhauser).

23. Gröbner geometry of Schubert and Grothendieck transition formulae (with Allen Knutson).

24. Presenting the cohomology of a Schubert variety (with Victor Reiner and Alexander Woo).

Theses

25. On combinatorics of degeneracy loci and $\mathrm{H}^*(G/B)$, a dissertation submitted to the Rackham graduate school, University of Michigan, 2003.

26. Seeing the factorizations for the trees, M.Math. thesis, University of Waterloo, Canada, 1999.

Expository notes

27. What is a Young tableau?, *Notices of the American Mathematical Society*, Volume 54, Number 2, February 2007.

28. Workshop on Computational and Combinatorial Commutative Algebra (with Ragnar Buchweitz and Greg Smith), *Fields Notes*, September 2006, Volume 7:1.

29. Lecture notes on the K-theory of the flag variety and the Fomin-Kirillov quadratic algebra (with Cristian Lenart), 2003. `www.math.umn.edu/~ayong/papers.html`

Software: available from my website

1. `Contingency`: Maple code for approximate counting og contingency tables, 2007.

2. `Cominrule`: Maple code to compute cominuscule Schubert calculus (with Hugh Thomas), 2006.

3. Maple code to compute Schubert calculus in G/B, 2006.

4. `Schubsingular`: Macaulay II code to compute singularities of Schubert varieties (with Alexander Woo), 2006.

5. C++ code for estimating permanents, hafnians and the number of forests in a graph, 2003.