CURRICULUM VITAE FOR IRENA SWANSON

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Education:

Ph.D., Purdue University, 1992
    Research area: Commutative algebra
    Thesis title: "Tight Closure, Joint Reductions, and Mixed Multiplicities"
    Thesis advisor: Craig Huneke

B.A., Reed College, 1987

Career history:

Professor and Department Head, Purdue University, July 2020-
Professor, Reed College, 2005-2020,
    chair of the Mathematics Department, 2013/14, 2014/15.
Fulbright-NAWI Graz Visiting Professor in the Natural Sciences,
    Graz, Austria, Fall 2018
Visiting Professor at University of Rome III, Italy, March 2010–May 2010
Visiting Professor at University of Ljubljana, Slovenia, Fall 2009
Professor, New Mexico State University, 2005–07
Mathematical Sciences Research Institute (MSRI), Berkeley, California, 2002–2003
Visiting Professor, University of Kansas, 2000–2001
Associate Professor, New Mexico State University, 2000–2005
Visiting Professor, University of L'Aquila, Italy, May-June 1999
Postdoctoral fellowship at MSRI, Berkeley, California, Fall 1998
Assistant Professor, New Mexico State University, 1995–2000
T. H. Hildebrandt Assistant Professor, University of Michigan, 1992–1995
Graduate teaching and research assistant, Purdue University, 1987–92

Honors:

Fellow of the American Mathematical Society, Class of 2019
Fulbright Fellowship, NAWI Graz, Austria, Fall 2018
Purdue University Mathematics Department Outstanding Alumna for 2007–08

Ph.D. students:

Ibrahim Al-Ayyoub, 2004, New Mexico State University
Rebecca Pablo García, 2004, New Mexico State University
Mark Rhodes, 2001, New Mexico State University

Co-advised Master's and Ph.D. students:

Alessio Sammartano, 2012, Master's degree, co-advised with Marco D'Anna, University of Catania, Italy

Francesca Di Giovannantonio, 2010, Ph.D., co-advised with Anna Guerrieri, University of L'Aquila, Italy

Trung Dinh, 2009, Ph.D., advised by Paul Roberts, University of Utah

Elena Grieco, 2005, Ph.D., co-advised with Anna Guerrieri, University of L'Aquila, Italy

Grants, fellowships and awards:

Partial financial support from the Banff International Research Station, Banff, Canada, for participation in the workshop "Workshop for Women in Commutative Algebra", October 2019.

Fulbright-NAWI Graz Scholarship for the semester in Graz, Austria, Fall 2018.

Grants from the Undergraduate Research Committee and the Dean of the Faculty at Reed College to support two students for two different research projects, and another grant from the Dean of the Faculty to support two students to work on course notes for the freshman introduction to analysis, Reed College, summer 2012.

Visiting Professor at University of Rome III, March 2010–May 2010, sponsored by Istituto Nazionale di Alta Matematica "Francesco Severi", Italy, through Professor Stefania Gabelli.

ADVANCE Institutional Transformation Program at New Mexico State University, fund NSF0123690, half-time teaching release during Spring 2005.

Co-Principal Investigator: National Science Foundation grant, INT 0332270, "US-India Workshop: Commutative Algebra, Algebraic Geometry and Combinatorics, Bangalore, India, December 2003", 2003. (Other co-principal investigators: Hema Srinivasan, Rekha Thomas.)

National Science Foundation grant, DMS 0200420, "Decompositions of ideals", 2002–05.

Travel Grant for the International Congress of Mathematicians in Beijing, China, 2002, from the American Mathematical Society.

Professional Opportunities for Women in Research and Education (POWRE NSF) grant, DMS 0073140, "Integral closure of ideals", 2000–01, at University of Kansas.

National Science Foundation grant, DMS 9970566, "Powers of ideals", 1999–2002.

Postdoctoral fellowship at the Mathematical Sciences Research Institute, Fall 1998.

Travel Grant for the International Congress of Mathematicians in Berlin, Germany, 1998, from the American Mathematical Society.

National Science Foundation grant, DMS 9623085, "Primary decompositions", 1996–1999.

Bibliography:

Differences in regularities of a power and its integral closure and symbolic power, with S. Yassemi, preprint 2022.

Introduction to Analysis with Complex Numbers, World Scientific Publishing, 2021. 456 pages.

Rees algebras of sparse determinantal ideals, with E. Celikbas, E. Dufresne, L. Fouli, E. Gorla, K.-N. Lin, C. Polini, arXiv:2101.03222.

Predicted decay ideals, with S. J. Weinstein, *Comm. in Algebra*, **48** (2020), 1089–1098. Published online on 26 October 2019.

Tensor-multinomial sums of ideals: primary decompositions and persistence of associated primes, (with R. M. Walker), *Proc. Amer. Math. Soc.* **147** (2019), 5071–5082.

Many associated primes of powers of prime ideals, (with J. Kim), *Journal of Pure and Applied Algebra* **223** (2019), 4888–4900.

Commutative algebra provides a big surprise for Craig Huneke's birthday, *Notices of the American Mathematical Society* **64** (2017), 256–259. Online at `www.ams.org/publications/journals/notices/201703/rnoti-p256.pdf`.

Three lectures on primary decompositions, binomial ideals, and algebraic statistics, EACA's Second International School On Computer Algebra and Applications, June 2013, Valladolid, Spain. Lecture Notes in Mathematics, **2176**, Springer, Cham, 2017.

Explicit Hilbert-Kunz functions of 2 x 2 determinantal rings, (with M. Robinson), *Pacific Journal of Mathematics* **275** (2015), 433–442.

Frobenius numbers of numerical semigroups generated by three consecutive squares or cubes, (with M. Lepilov, J. O'Rourke), *Semigroup Forum* **91** (2015), 238–259.

2 x 2 permanental ideals of hypermatrices, (with J. Porcino), *Comm. Alg.* **43** (2015), 84–101.

Integral closure, expository paper and open questions, in *Commutative Algebra, Recent Advances in Commutative Rings, Integer-Valued Polynomials, and Polynomial Functions*, edited by M. Fontana, S. Frisch, and S. Glaz. Springer, 2014. 331–351.

Searching for Cutkosky's example, (with F. Di Giovannantonio and A. Guerrieri), *Rocky Mountain J. of Math.* **44** (2014), 865–876.

Hilbert-Kunz functions of 2 x 2 determinantal rings, (with L. Miller), *Illinois J. of Math.* **57** (2013), 251–277.

Minimal primes of ideals arising from conditional independence statements, (with A. Taylor), *J. Algebra* **392** (2013), 299–314.

Quilting semiregular tessellations, Chapter 9 in *Crafting by Concepts*. Edited by: s.-m. belcastro and C. Yackel. A K Peters, 2011. 187–232.

Rees valuations, expository article, in "Commutative Algebra: Noetherian and Non-Noetherian Perspectives". Edited by M. Fontana, S. Kabbaj, B. Olberding, and I. Swanson. Springer, 2011. 421–440.

Every numerical semigroup is one over d of infinitely many symmetric numerical semigroups, in *Conference Proceedings of the Fifth International Fez Conference on Commutative Algebra and Applications*, Fez, Morocco, June 2008. Edited by M. Fontana, S. Kabbaj, B. Olberding, and I. Swanson. De Gruyter, 2009. 383 – 386.

An algorithm for computing the integral closure, (with A. K. Singh), *Algebra and Number Theory* **3** (2009), 587–595.

Goto numbers of parameter ideals, (with W. Heinzer), *J. Algebra* **321** (2009), 152–166.

Adjoints of ideals, (with R. Hübl), *Michigan Math. J.* **57** (2008), 447–462.

Multigraded Hilbert functions and mixed multiplicities, a chapter in *Syzygies and Hilbert Functions*, edited by I. Peeva. Lecture Notes in Pure and Applied Mathematics series by CRC, (2007), 267–280.

Integral Closure of Ideals, Rings, and Modules, (with Craig Huneke), Cambridge University Press, Cambridge, 2006. Also available at `http://www.reed.edu/ iswanson/book`.

Review of *Pierro della Francesca: A Mathematician's Art*, by J. V. Field, (with D. E. Katz), *Sixteenth Century Journal* **XXXVIII/1** (2007), 300–301.

Permanental ideals and Hankel matrices, (with E. Grieco and A. Guerrieri), *Abh. Math. Sem. Univ. Hamburg* **77** (2007), 39–58.

Primary decompositions, in *Proc. Int. Conf. – Commutative Algebra and Combinatorics* (Allahabad, India, December 2003). Editor W. Bruns et al, No. 2, 2006, 117–155.

Symbolic powers of radical ideals, (with A. Li), *Rocky Mountain J. of Math.* **36** (2006), 997–1009.

On free integral extensions generated by one element, (with O. Villamayor), in Proceedings of Sevilla, June 2003 and Lisbon, June 2003. Marcel Dekker's Lecture Notes in Pure and Applied Mathematics Series. Edited by A. Corso, P. Gimenez, M. V. Pinto, S. Zarzuela. Chapman-Hall 2005. 239–257.

Computing instanton numbers of curve singularities, (with E. Gasparim), *Journal of Symbolic Computation* **40** (2005), 965–978.

Erratum to "Integral closure of ideals in excellent local rings", (with D. Delfino), *J. Algebra* **274** (2004), 422–428.

Associated primes of local cohomology modules and of Frobenius powers, (with A. Singh), *International Mathematics Research Notices* **30** (2004), 1703–1733.

Computations with Frobenius powers, (with S. Hermiller), *Journal of Experimental Mathematics* **14** (2005), 161–173.

On the ideal of minors of matrices of linear forms, (with A. Guerrieri), in "Proceedings of the Special Session on Commutative Algebra and Its Interaction with Algebraic Geometry and Conference on Commutative Algebra and Algebraic Geometry", Edited by: L. Avramov, M. Chardin, M. Morales, and C. Polini. Contemporary Mathematics **331** (2003), 139–152.

Notes on the behavior of the Ratliff-Rush filtration, (with M. E. Rossi), in same proceedings as the previous paper, 313–328.

On the embedded primes of the Mayr-Meyer ideals, *J. Algebra* **275** (2004), 143–190.

The minimal components of the Mayr-Meyer ideals, *J. Algebra* **267** (2003), 127–155.

Ten lectures on tight closure, IPM Lecture Note Series, 3, Tehran, 2002.

The first Mayr-Meyer ideal, in "Proceedings of the Fourth International Conference on Commutative Ring Theory and Applications", Fez, Morocco, June 2001. Edited by M. Fontana, S.-E. Kabbaj, and S. Wiegand. 2002, 435–444.

The Zarankiewicz problem via Chow forms, (with M. Petkovšek and J. Pommersheim), in "Computational Commutative Algebra and Combinatorics", Advanced Studies in Pure Mathematics, 33, editor T. Hibi, Mathematical Society of Japan, Tokyo, 2002, 203–212.

Normal cones of monomial primes, (with R. Hübl), *Math. of Comp.*, **72** (2003), 459–472.

Jacobian ideals of trilinear forms: an application of 1-genericity, (with A. Guerrieri), *J. Algebra*, **226** (2000), 410–435.

Discrete valuations centered on local domains, (with R. Hübl), *J. Pure Appl. Algebra*, **161** (2001), 145–166.

Permanental ideals, (with R. Laubenbacher), *J. Symbolic Comput.*, **30** (2000), 195–205.

Zeros of differentials along ideals, appendix to R. Hübl's Derivations and the integral closure of ideals, *Proc. Amer. Math. Soc.*, **127** (1999), 3503–3511.

Linear equivalence of ideal topologies, *Math. Zeitschrift*, **234** (2000), 755–775.

Linear bounds on growth of associated primes for monomial ideals (with K. E. Smith), *Comm. Alg*, **25** (1997), 3071–3079.

Powers of ideals: primary decompositions, Artin-Rees lemma and regularity, *Math. Annalen*, **307** (1997), 299–313.

Ideals contracted from 1-dimensional overrings with an application to the primary decomposition of ideals (with W. Heinzer), *Proc. Amer. Math. Soc.*, **125** (1997), 387–392.

Integral closure of ideals in excellent local rings, (with D. Delfino), *J. Algebra*, **187** (1997), 422–445.

Cores of ideals in two dimensional regular local rings (with C. Huneke), *Michigan Math. J.*, **42** (1995), 193–208.

Joint reductions, tight closure and the Briançon-Skoda theorem, II, *J. Algebra*, **170** (1994), 567–583.

Primary decompositions of powers of ideals, "Proceedings of Mt. Holyoke Conference on Commutative Algebra: Syzygies, Multiplicities and Birational Algebra", Contemporary Mathematics, Volume **159**, 1994, 367–371.

A note on analytic spread, *Comm. in Algebra* **22(2)** (1994), 407–411.

Mixed multiplicities, joint reductions, and a theorem of Rees, *J. London Math. Soc.*, **48** (1993), 1–14.

Joint reductions, tight closure and the Briançon-Skoda theorem, *J. Algebra*, **147** (1992), 128–136.

Recent invited talks:

Graduate Course on Tight Closure of Ideals and Its Applications, ICTP (virtually), July 2022, "Uniform Artin-Rees results", three lectures.

Commutative algebra seminar, Purdue University, April 2022, "Commutative algebra seminar".

Colloquium, University of Puerto Rico Mayaguez Campus, online, March 2022, "Computing in algebra".

Virtual talk in the Fellowship of the Rings, MSRI, May 2021, "Numbers of associated primes of powers of ideals".

The 17th (Virtual) Seminar on Commutative Algebra and Related Topics, IPM, Tehran, Iran, January 2021, "Primary decomposition and powers of ideals".

Virtual Commutative Algebra Seminar, IIT Bombay, India, September 2020, "Primary decomposition and powers of ideals".

Colloquium, Purdue University, West Lafayette, Indiana, February 2020, "Primary decompositions".

AMS Special Session in Commutative Algebra, Denver, Colorado, January 2020, "Numbers of associated prime ideals of powers of monomial ideals".

Algebra seminar, Ohio State University, Columbus, Ohio, January 2020, "Primary decompositions of powers of ideals".

AMS Special Session in Commutative Algebra: in Celebration of the 150th Birthday of Roger and Sylvia Wiegand, Madison, Wisconsin, September 2019, "Monomial ideals whose powers have predicted decreasing numbers of associated primes".

MAA Invited Address at the MAA MathFest, Cincinnati, Ohio, August 2019, "Solving Algebraic Equations".

Seminar, University of Klagenfurt, Austria, November 2018, "Solving algebraic equations".

Algebra and number theory seminar, University of Graz, Austria, October 2018, "A survey of homological algebra".

Commutative algebra seminar, University of Michigan, Ann Arbor, Michigan, February 2018, "Prime ideals whose powers have many associated primes".

Algebra seminar, University of Nebraska, Lincoln, Nebraska, January 2018, "Prime ideals whose powers have many associated primes".

Plenary talk at the Nebraska Conference for Undergraduate Women in Mathematics, Lincoln, Nebraska, January 2018, "Life in the algebra lane".

Ongoing professional service:

Panelist on promotion and tenure at the 12th Annual Conference for Assistant Professors titled "Institutional Resources to Soar to Promotion", organized by the Susan Bulkeley Butler Center for Leadership Excellence, Purdue University, 13-14 October 2021.

Steering Committee of the Park City Mathematics Institute (PCMI), 2016–.

Editorial board of the Journal of Commutative Algebra, 2008–.

Moderator of the commutative algebra section of Mathematics ArXiv (electronic archives of mathematics papers), 2002–. Starting in 2007, I am a co-moderator with Anurag Singh.

Refereed papers for many mathematics journals and conference proceedings.

Refereed grant proposals or were on a panel for:

National Science Foundation, USA

National Security Agency, USA

EPSRC (Engineering and Physical Sciences Research Council), Great Britain

NSERC, Canada

Austrian Science Foundation

Fields Institute, Canada
Reviewed papers for:
    Mathematical Reviews
    Zentralblatt
I have written substantial (unpublished) course notes: for introduction to analysis (without the construction of the real numbers); for abstract algebra; for homological algebra; for functional analysis (with emphasis on counterexamples when hypotheses are omitted from theorems).

Select past professional service:

Editorial board of a special issue of the Journal of Algebra in honor of Craig Huneke, 2016–2021.

Editorial board of the journal Communications in Algebra, 2002–2012. In this 10-year period I handled 766 papers for the journal.

With Craig Huneke I wrote a graduate-level textbook on integral closure, 2000–2006.

Member of:

American Mathematical Society
Association for Women in Mathematics
Mathematical Association of America
Društvo matematikov, fizikov in astronomov Slovenije
Phi Beta Kappa