CURRICULUM VITAE FOR IRENA SWANSON

July 2020

Irena Swanson
Purdue University
150 N. University Street
West Lafayette, IN 47907

Office telephone: (765) 494-1909
E-mail address: irena@purdue.edu
Web site: https://www.math.purdue.edu/~iswanso/

Education:

Ph.D., Purdue University, 1992
B.A., Reed College, 1987

Career history:

Professor and Department Head, Purdue University, July 2020-
Professor, Reed College, 2005-June 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.

Member of:

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

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.

Bibliography:

Predicted decay ideals, with S. J. Weinstein, *Comm. in Algebra*, 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), 5081–5082.

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.

Selected invited talks:

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".

AMS conference in Pullman, Washington, April 2017, "Associated primes of powers of ideals".

REU program at Willamette University, Salem, Oregon, July 2015, "Free resolutions and some Gröbner bases".

Pacific Undergraduate Research Experience in Mathematics (PURE Math) in Hilo, Hawai'i, July 2015, "Commuting matrices".

EACA's Second International School on Computer Algebra and Applications, Valladolid, Spain, June 2013, three lectures: "Primary decomposition algorithms", "Binomial ideals", "Binomial ideals and primary decomposition in algebraic statistics".

AMS conference in San Diego, California, January 2013, "Ideals of 2×2 minors of hypermatrices".

Conference on Commutative Rings, Integer-valued Polynomials and Polynomial Functions, Graz, Austria, December 2012, "Conditional independence and permanental ideals".

Three lectures on integral closure at the Preparatory Mini Course in Graz, Austria, December 2012.

Connections for Women: Joint Workshop on Cluster Algebras and Commutative Algebra, at Mathematical Sciences Research Institute, Berkeley, August 2012, "Minimal components over certain binomial ideals".

Conference on Commutative rings and their modules, 2012, in honor of Marco Fontana's

60th birthday, Bressanone, Italy, June 2012, "Structure of some conditional independence ideals".

AMS conference in Salt Lake City, Utah, October 2011, "2 x 2 permanental ideals of hypermatrices".

Mathematics Talk, Reed College, Portland, Oregon, October 2011, "Conditional independence ideals and permanents".

Mathematical Sciences Research Institute (MSRI), Berkeley, California, June 2011, Summer Graduate Workshop "Commutative Algebra", six lectures on resolutions, binomial ideals, primary decomposition, and the Buchsbaum–Eisenbud exactness criterion.

Five lectures in the School on Local Rings and Local Study of Algebraic Varieties, ICTP Trieste, Italy, June 2010, "Integral closures of ideals and rings".

Ten lectures at the Fields Summer School in Ottawa, July 2006, on integral closures, Rees valuations, and computational aspects.

Ongoing professional service:

My notes Introduction to Analysis, the short and the long versions, were accepted on AMS Math Open Notes, November 2019. The notes introduce a new system for teaching proofs. The long version constructs the real numbers and arithmetic on it from set theory, in the short one I assume that the set of reals is a complete ordered field. The notes end with complex-valued series with applications to trigonometry.

I have written other substantial (unpublished) course notes: for abstract algebra; for homological algebra; for functional analysis (with emphasis on counterexamples when hypotheses are omitted from theorems).

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

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.

Reviewed papers for:

Mathematical Reviews,
Zentralblatt.