Curriculum Vitae for

Kristen A. Beck

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Education

Ph.D. Mathematics, May 2011, University of Texas at Arlington
Dissertation title: *On the existence of totally reflexive modules*
Dissertation advisor: Prof. David A. Jorgensen

M.S. Mathematics, August 2005, University of Texas at Arlington
Thesis title: *On the image of the totaling functor*
Thesis advisor: Prof. David A. Jorgensen

B.S. Mathematics, May 2002, University of Texas at Arlington

Research Interests

Commutative algebra. Homological algebra. Differential graded (DG) algebra.

Academic Appointments

2014–present **Assistant Professor of Mathematics, Saint Mary's College of California** (SMC)

2011–2014 **Teaching Postdoctoral Fellow, University of Arizona** (UA)

2007–11/2003–05 **Graduate Teaching Assistant, University of Texas at Arlington** (UT Arlington)

Other Appointments

2007–08 Lecturer. Department of Kinesiology, UT Arlington.

2005–07 Credit Risk Analyst. AmeriCredit Corp. (GM Financial), Fort Worth, TX.

Fellowships & Scholarships

* **NSF STEM Doctoral Fellowship.** 2007–09 and 2010–11.
* **NSF GK-12 Fellowship.** 2009–10.
* **Hermann's Doctoral Fellowship.** UT Arlington Department of Mathematics, 2005–06.
* **Stephen R. Bernfeld Memorial Scholarship.** UT Arlington Department of Mathematics, 2005–06.
* **Graduate Fellowship.** UT Arlington Department of Mathematics, 2005–06.

Honors & Awards

* **Teaching Service Award.** UA Department of Mathematics, 2014.
* **Outstanding Graduate Student Award.** UT Arlington Department of Mathematics, 2011.
* **Excellence Award for Effective Leadership in K-12 School Outreach Activities.** UT Arlington Department of Mathematics, NSF GK-12 MAVS Program, 2010.

External Funding

* **PI: Western Alliance to Expand Student Opportunities, \$4,500**. In support of *(Non-) Periodicity of Betti Numbers Over a Class of Short Local Rings* (undergraduate research project), Summer 2013.
* **PI: MAA Tensor Women in Mathematics Grant, \$4,500**. In support of *Women Advancing Arizona Mathematics*, 7/1/2013–6/30/2014.
* **PI: NSF Conference Grant, \$15,692**. In support of the *2013 Southwest Local Algebra Meeting*, 1/1/2013–12/31/2013.

Internal Funding

- UA Department of Mathematics, $4,500. In support of *Women Advancing Arizona Mathematics*, 2013–2014.
- UA Department of Mathematics, $3,200. In support of the *2013 Southwest Local Algebra Meeting*.

Teaching Experience

- Courses taught at SMC:
    - **Abstract Algebra I** (Sp16)
    - **Calculus III** (Fa15)
    - **Analysis I** (Sp15)
    - **Finite Mathematics** (Sp15)
    - **Calculus I** (Fa14, Sp15)
    - **Math for Liberal Arts** (Fa14, Fa15, Sp16)
- Courses taught at UA:
    - **Cryptography** (Sp14)
    - **Matrix Analysis** (Su13)
    - **Math Analysis for Engineers** (Sp13)
    - **Intro to Statistics** (Sp13, Fa13)
    - **Intro to Linear Algebra** (Sp12, Fa12, Fa13)
    - **Calculus II** (Sp12, Fa12)
    - **Vector Calculus** (Fa11)
    - **Calculus I** (Fa11)
- Courses taught at UT Arlington:
    - **Calculus I** (Sp11)
    - **College Algebra** (Fa10)
    - **Business Calculus** (Sp08, Su08, Fa08, Sp09)
    - **Trigonometry** (Su05, Fa08)
    - **Math for Liberal Arts** (Sp04, Fa04, Sp05)

Undergraduate Research Projects

- *Nth Roots of Fibonacci Fractions*, with Elijah Soria. Summer 2015.
- *(Non-)Periodicity of Betti Numbers over a Class of Short Local Rings*, with Omar Beltran, Carlos Parades, and Dillon Peña. A study of the structure of minimal free resolutions of modules over the quotient of a polynomial ring. Funded by the Western Alliance to Expand Student Opportunities. Summer 2013.
- *New Views on the Yoneda Lemma*, with David Sidi. A mapping-diagrammatic interpretation of the Yoneda embedding and isomorphism. Applications of the Yoneda Lemma to propositional logic. Spring/Fall 2013.

Publications

1. *Augmented generalized happy functions* (with B. Baker Swart, S. Crook, C. Eubanks-Turner, H. G. Grundman, M. Mei, and L. Zack, submitted). `arXiv:1410.0297`

2. *Eventually linear partially complete resolutions over a local ring with $\mathfrak{m}^4 = 0$*, J. Algebra Appl. (to appear). `arXiv:1212.0282`

3. *On the image of the totaling functor*, Comm. Algebra (to appear). `arXiv:1105.3869`

4. *A somewhat gentle introduction to differential graded commutative algebra* (with S. Sather-Wagstaff), lecture notes (Springer) on Connections Between Algebra and Geometry (to appear). `arXiv:1307.0369`

5. *Krull dimension for differential graded algebras* (with S. Sather-Wagstaff), Arch. Math. (Basel), **101** (2013), no. 2, 111–119. `arXiv:1210.7270`

6. *Asymptotic behavior of dimensions of syzygies* (with M. Leamer), Proc. Amer. Math. Soc. **141** (2013), no. 7, 2245–2252. `arXiv:1110.4582`

7. *Existence of totally reflexive modules via Gorenstein homomorphisms*, J. Commut. Algebra **4** (2012), no. 1, 57–77. `arXiv:1101.2658`

Works in Progress

1. *More on augmented generalized happy functions* (with B. Baker Swart, S. Crook, C. Eubanks-Turner, H. G. Grundman, M. Mei, and L. Zack).

2. *To kill an x: Quotient structures in Algebra II* (with T. Jorgensen).

Invited Conference & Summer School Lectures

∗ **2014 Joint Mathematics Meeting**, Special Session on *Homological and Characteristic p Methods in Commutative Algebra*. 20-minute lecture. Baltimore, MD, January 2014.

∗ **Workshop on Representation Theory, Homological Algebra, and Free Resolutions**. 20-minute lecture on *Depth and dimension for high syzygies*. Berkeley, CA, February 2013.

∗ **Further Connections Between Algebra & Geometry**. 40-minute lecture on *Two notions of Krull dimension for differential graded algebras*. Fargo, ND, February 2013.

∗ **2012 CMS Summer Meeting**, AMS Special Session on *Interactions Between Algebraic Geometry & Commutative Algebra*. 20-minute lecture on *Depth and dimension of high syzygies*. Regina, SK, Canada, June 2012.

∗ **Summer School on the Interactions Between Algebra and Geometry**. Lecture Assistant for Session on *Differential Graded Techniques in Commutative Algebra*. Regina, SK, Canada, May 2012.

∗ **2012 Southwest Local Algebra Meeting**. 50-minute lecture *On the behavior of depth and dimension of high syzygy modules*. Lubbock, TX, March 2012.

∗ **2011 Joint Mathematics Meeting**, AMS Special Session on *Commutative Algebra (MRC)*. 20-minute lecture on *Necessary conditions for the existence of totally reflexive modules*. New Orleans, LA, January 2011.

∗ **Spring 2010 AMS Western Sectional Meeting**, Special Session on *Trends in Commutative Algebra*. 20-minute lecture *On the Hilbert series of an $\mathfrak{m}^4 = 0$ local ring admitting linear complete resolutions*. Albuquerque, NM, April 2010.

∗ **Fall 2009 AMS Central Sectional Meeting**, Special Session on *Commutative Algebra: Module & Ideal Theory*. 20-minute lecture *On the existence of totally reflexive modules*. Waco, TX, October 2009.

Conference & Workshop Participation

∗ **Mathematical Sciences Research Institute**. Workshop on *Representation Theory, Homological Algebra, and Free Resolutions*. Berkeley, CA, February, 2013.

∗ **AMS Mathematics Research Communities**. Workshop on *Commutative Algebra*. Snowbird, UT, June 2010.

∗ **Oberwolfach Mathematics Institute**. Workshop Seminar on *Representations of Finite Groups: Local Cohomology and Support*. Oberwolfach, Germany, May 2010.

∗ **Commutative Algebra: Connections with Algebraic Topology and Representation Theory**. Lincoln, NE, May 2008.

∗ **Nebraska Commutative Algebra Conference: WiegandFest**. Lincoln, NE, May 2005.

Contributed Lectures & Posters

∗ **2011 KUMUNU**. Poster on *Existence of totally reflexive modules via Gorenstein homomorphisms*. Lincoln, NE, April 2011.

∗ **2011 Southwest Local Algebra Meeting**. Poster on *Necessary conditions for the existence of asymmetric linear complete resolutions over short local rings*. Las Cruces, NM, March 2011.

∗ **2011 Joint Mathematics Meeting**, Project NExT/YMN Poster Session. Poster *On the structure of the derived category of DG modules over a polynomial ring*. New Orleans, LA, January 2011.

∗ **Conference for the Advancement of Mathematics Teachers**. 60-minute lecture/activity on *Sometimes $2 + 2 \neq 4$: An introduction to quotient structures*. San Antonio, TX, July 2010.

∗ **2010 Southwest Local Algebra Meeting**. Poster *On the Hilbert series of $\mathfrak{m}^4 = 0$ rings which admit non-trivial totally reflexive modules*. Arlington, TX, March 2010.

∗ **2010 Joint Mathematics Meeting**, AMS Contributed Session on *Fields & Commutative Algebra*. 10-minute lecture on *Characterizing rings which admit non-trivial totally reflexive modules*. San Francisco, CA, January 2010.

Contributed Lectures & Posters, Cont'd

* **UT Arlington College of Science Research Day**. Poster *On the existence of totally reflexive modules*. Arlington, TX, October 2008.
* **UT Arlington ACES Symposium**. 20-minute lecture *On the rigidity of Tor*. Arlington, TX, March 2008.
* **2008 Joint Mathematics Meeting**, AMS Contributed Session on *Algebra & Number Theory*. 10-minute lecture on *The image of the totalling functor*. San Diego, CA, January 2008.

Selected Seminar Lectures

* *UA Algebra & Number Theory Seminar*. Tucson, AZ, September 2012.
* *Metroplex AGANT Seminar*. Arlington, TX, February 2012.
* *Norwegian University of Science and Technology Algebra Seminar*. Trondheim, Norway, December 2011.
* *North Dakota State University Algebra Seminar*. Fargo, ND, October 2011.
* *University of Toronto Homological Methods Seminar*. Toronto, ON, Canada, March 2011.
* *University of Nebraska-Lincoln Commutative Algebra Seminar*. Lincoln, NE, February 2011.
* *Texas A&M Algebraic Geometry Seminar*. College Station, TX, April 2010.
* *Texas Tech Algebra Seminar*. Lubbock, TX, April 2010.
* *UT Arlington Algebra Seminar*. Arlington, TX, April 2009, April 2008, and September 2004.

Expository Lectures

* *On the Desmos Graphing App*. SMC Math Wednesdays. Spring 2015.
* *TBD*. SMC Math Mondays. Spring 2015.
* *In-class student response systems* (with R. Thomas). UA Mathematics Instruction Colloquium. Fall 2013.
* *Syzygy: More than just a funny word*. UA Undergraduate Mathematics Colloquium. November 2012.
* *Incorporating abstraction: Getting students out of the concrete box*. UA Mathematics Instruction Colloquium. January 2012.
* *Oh, the plentitude of primes!* UA MathCats meeting. November 2011.
* *The field of constructible numbers: A story of how algebra solved three famous geometric problems*. UA Undergraduate Teaching Assistant Seminar. September 2011.

Conference, Meeting, & Special Session Organization

* **Southwest Local Algebra Meeting** (with L. W. Christensen, L. Fouli, R. Heitmann, and D. Jorgensen). The University of Arizona, March 2013.
* **Special Session on Topics in Commutative Algebra** (with S. Saccon), at the Fall 2012 AMS Western Sectional Meeting. Tucson, AZ, October 2012.

Seminar & Colloquium Organization

* **Math Instruction Colloquium**, with G. Hystad (`http://math.arizona.edu/~mathinst`). Bi-weekly talks on issues relevant to mathematics instructors; bi-weekly reading group focused on the scholarship of teaching and learning. UA, Fall 2013–present.
* **Women Advancing Arizona Mathematics Colloquium** (`http://math.arizona.edu/~waam`). Weekly talks promoting the accomplishments of female mathematicians in various fields. UA, Fall 2013–Spring 2014.
* **Mathematics Brown Bag Seminar** (`http://math.arizona.edu/~kbeck/brown-bag`). Bi-weekly research talks accessible to mid- to upper-division math majors. UA, Spring 2013–present.
* **Teaching Postdoc Seminar**, with E. Widiasih. Monthly meetings focused on the scholarship of teaching and learning and other various aspects of teaching. UA, Fall 2012.
* **UT Arlington Graduate Student Seminar**, with P. Veerapen. Weekly research talks given by graduate students. Fall 2010–Spring 2011.
* **UT Arlington Algebra Seminar**. Weekly research talks accessible to advanced graduate students and faculty studying algebra. Spring/Fall 2005.

Innovation & Methods in Teaching

* Incorporation of an **inquiry-based, flipped classroom** model.
* Use of the **in-class response system** 'Learning Catalytics' (`http://www.learningcatalytics.com`).
* Connection of mathematics to **literature**.
* Use of an **online discussion forum**.
* Facilitation of **online office hours** via Google Hangouts.
* Coordinator for credit-based **Preceptor Program for Intro to Linear Algebra**. Fall 2013–present.
* Coordinator for **UA Undergraduate Teaching Assistant (UTA) Program & Seminar**. Spring/Fall 2012.
* Member of **undergraduate subcommittee on MATLAB in Linear Algebra** at UA. Fall 2013.
* Member of **course development team** for Math for Liberal Arts at UT Arlington. Fall 2004.

Mentoring & Advising

* Faculty advisor for the **Math and Physics Club**. SMC, Fall 2014–present.
* Assistant and advisor for **Minority Calculus Advising Program**. UA, Fall 2012/2013.
* Faculty advisor for **MathCats** (club for undergraduate math majors). UA, Fall 2011–Spring 2013.
* Member of **AWM Mentor Network**. Spring 2011–present.

Service to the College, School, & Department

* Member of **Math and Scientific Understanding Working Group**. Fall 2014–present.
* School of Science representative to the **Academic Probation Review Board**. Fall 2014.
* Poster judge for **School of Science Student Research Program**. Summer 2014.

Outreach Activity

* Co-organizing **Tech Trek STEM Day** (with AAUW, Lamorinda chapter). Saint Mary's College of California, Summer 2016.
* Panelist for **NSBE Jr. STEM Day**. Oakland, CA, February 2015.
* Content coordinator and facilitator for **Sam Houston High School Math Club**. Arlington, TX, 2009–10.
* Volunteer for annual **UT Arlington Calculus Bowl**. Arlington, TX, February 2010.
* Activity leader for **Riverside Middle School Math & Science Day**. Fort Worth, TX, February 2010 and November 2008.

Professional Development

* American Institute of Mathematics workshop on *Research Experience for Undergraduate Faculty*. Palo Alto, CA, July 2014.
* MAA minicourse on *Directing Undergraduate Research*. Baltimore, MD, January 2014.
* MAA PREP worshop on *Inquiry-Based Learning*. San Luis Obispo, CA, June 2013.
* American Institute of Mathematics workshop on *Careers in Academia*. Palo Alto, CA, June 2012.

Society Membership

* American Mathematical Society.
* Association for Women in Mathematics.
* Mathematical Association of America.
* Pi Mu Epsilon.