

Graham J. Leuschke

Curriculum Vitæ

☎ 315/443-1500
✉ gjleusch@syr.edu
🌐 www.leuschke.org
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Employment

- 2014–today **Professor** at *Syracuse University*.
2007–2014 **Associate Professor** at *Syracuse University*.
2004–2007 **Assistant Professor** at *Syracuse University*.
2003–2004 **Post-doctoral Fellow** at *University of Toronto*.
2000–2003 **Assistant Professor** at *University of Kansas*.
1995–2000 **Graduate Teaching Assistant** at *University of Nebraska–Lincoln*.

Education

- 2000 **Ph.D.** *University of Nebraska–Lincoln*, Lincoln NE.
Advisor: Roger Wiegand
Dissertation: *Finite Cohen–Macaulay Type*
1997 **M.A.** *University of Nebraska–Lincoln*, Lincoln NE.
1995 **B.A.** *Reed College*, Portland OR.
Advisor: V. Rao Potluri
Thesis: *Galois cohomology and profinite groups*

Grants and Funding

- 2013–2015 **NSA Grant 110927**, “Theory and applications of maximal Cohen-Macaulay modules”.
2013 **MSRI General Member** associated with semester-long program in *Non-commutative Algebraic Geometry*.
2010 **AMS Travel Grant** to attend *ICM in Hyderabad, India*.
2009–2013 **NSF Grant DMS-0902119**, “Topics in the Representation Theory of Local Rings”.
2006–2009 **NSF Grant DMS-0556181**, “Topics in the Representation Theory of Local Rings”.
2006 **AMS Travel Grant** to attend *ICM in Madrid, Spain*.
2004–2006 **NSA Young Investigator Grant**.
2003 **MSRI General Member** associated with year-long program in *Commutative Algebra*.
2000–2003 **NSF Mathematical Sciences Research Postdoctoral Fellowship** taken at the *University of Kansas*.
2000 **Clay Liftoff Mathematician** sponsored for summer research by *Clay Mathematics Institute*.

Research Interests

- Commutative Algebra
- Representation Theory
- Non-commutative Algebraic Geometry
- Algebraic Geometry

Publications

Books

- [1] Srikanth B. Iyengar, GJL, Anton Leykin, Claudia Miller, Ezra Miller, Anurag Singh, and Uli Walther. *Twenty-four hours of local cohomology*, volume 87 of *Graduate Studies in Mathematics*. American Mathematical Society, Providence, RI, 2007. xviii+282 pages. ISBN: 978-0-8218-4126-6.
- [2] GJL and Roger Wiegand. *Cohen-Macaulay representations*, volume 181 of *Mathematical Surveys and Monographs*. American Mathematical Society, Providence, RI, 2012. xviii+367 pages. ISBN: 978-0-8218-7581-0. URL: <http://www.leuschke.org/research/MCMBBook>.

articles available from www.leuschke.org/Research/Papers/

Articles

- [1] GJL and Roger Wiegand. Ascent of finite Cohen-Macaulay type. *J. Algebra*, 228(2):674–681, 2000. doi:10.1006/jabr.2000.8294.
- [2] GJL. Mixed characteristic hypersurfaces of finite Cohen-Macaulay type. *J. Pure Appl. Algebra*, 167(2-3):225–257, 2002. doi:10.1016/S0022-4049(01)00044-5.
- [3] GJL. Gorenstein modules, finite index, and finite Cohen-Macaulay type. *Comm. Algebra*, 30(4):2023–2035, 2002. doi:10.1081/AGB-120013229.
- [4] Craig Huneke and GJL. Two theorems about maximal Cohen-Macaulay modules. *Math. Ann.*, 324(2):391–404, 2002. doi:10.1007/s00208-002-0343-3.
- [5] Craig Huneke and GJL. Local rings of countable Cohen-Macaulay type. *Proc. Amer. Math. Soc.*, 131(10):3003–3007 (electronic), 2003. doi:10.1090/S0002-9939-03-07167-3.
- [6] Ian M. Aberbach and GJL. The F -signature and strong F -regularity. *Math. Res. Lett.*, 10(1):51–56, 2003.
- [7] Craig Huneke and GJL. On a conjecture of Auslander and Reiten. *J. Algebra*, 275(2):781–790, 2004. doi:10.1016/j.jalgebra.2003.07.018.
- [8] GJL and Roger Wiegand. Hypersurfaces of bounded Cohen-Macaulay type. *J. Pure Appl. Algebra*, 201(1-3):204–217, 2005. doi:10.1016/j.jpaa.2004.12.028.
- [9] GJL and Roger Wiegand. Local rings of bounded Cohen-Macaulay type. *Algebr. Represent. Theory*, 8(2):225–238, 2005. doi:10.1007/s10468-004-8319-5.
- [10] GJL. Appendix to “Tight closure theory and characteristic p methods”, by M. Hochster. In *Trends in commutative algebra*, volume 51 of *Math. Sci. Res. Inst. Publ.*, pages 181–210. Cambridge Univ. Press, Cambridge, 2004.
- [11] GJL. Endomorphism rings of finite global dimension. *Canad. J. Math.*, 59(2):332–342, 2007. doi:10.4153/CJM-2007-014-1.
- [12] Ragnar-Olaf Buchweitz and GJL. Factoring the adjoint and maximal Cohen-Macaulay modules over the generic determinant. *Amer. J. Math.*, 129(4):943–981, 2007. doi:10.1353/ajm.2007.0022.
- [13] David A. Jorgensen and GJL. On the growth of the Betti sequence of the canonical module. *Math. Z.*, 256(3):647–659, 2007. doi:10.1007/s00209-006-0096-x.
- [14] Ragnar-Olaf Buchweitz, GJL, and Michel Van den Bergh. Non-commutative desingularization of determinantal varieties I. *Invent. Math.*, 182(1):47–115, 2010. doi:10.1007/s00222-010-0258-7.

- [15] Andrew Crabbe and GJL. Wild hypersurfaces. *J. Pure Appl. Algebra*, 215(12):2884–2891, 2011. doi:10.1016/j.jpaa.2011.04.009.
- [16] David A. Jorgensen, GJL, and Sean Sather-Wagstaff. Presentations of rings with non-trivial semidualizing modules. *Collect. Math.*, 63(2):165–180, 2012. doi:10.1007/s13348-010-0024-6.
- [17] GJL. Non-commutative crepant resolutions: scenes from categorical geometry. In S. Sather-Wagstaff et. al., editor, *Progress in commutative algebra 1: Ring Theory, Homology, and Decompositions*, De Gruyter Proceedings in Mathematics, pages 293–361. de Gruyter, Berlin, 2012.
- [18] GJL and Roger Wiegand. Brauer-Thrall theory for maximal Cohen-Macaulay modules. In I. Peeva, editor, *Commutative Algebra: Expository papers dedicated to David Eisenbud on the occasion of his 65th birthday*, pages 577–592. Springer Verlag, 2013.
- [19] Ragnar-Olaf Buchweitz, GJL, and Michel Van den Bergh. On the derived category of Grassmannians in arbitrary characteristic. *Comp. Math.*, 2015. to appear.

Articles in progress or in press

- [1] Ragnar-Olaf Buchweitz, GJL, and Michel Van den Bergh. Non-commutative desingularization of determinantal varieties, II: Arbitrary minors. Submitted, 2013. arXiv:1106.1833.

Other mathematical writing

- [1] GJL. Noncommutative resolutions. *Emissary: the newsletter of the Mathematical Sciences Research Institute*, 2013. URL: <http://www.msri.org/attachments/media/news/emissary/EmissarySpring2013.pdf>.

Selected Invited Lectures, Last 7 Years

- notes and some videos available from www.leuschke.org/Research/Talks/*
- 2014 Apr. “The derived category of Grassmannian varieties”, *AMS Special Session*, Lubbock TX.
 - Aug. “Non-commutative desingularizations and Cohen-Macaulay representations”, *Workshop and International Conference on Representations of Algebras (ICRA 2014)*, Sanya, China, series of four one-hour lectures.
 - 2013 Dec. “Pieri maps and the bound Young quiver”, *Winter Meeting of the Canadian Mathematical Society*, Ottawa, Ontario, Canada.
 - Sep. “Pieri maps and the bound Young quiver”, *AMS Special Session*, Louisville KY.
 - Feb. “Non-commutative desingularizations and maximal Cohen-Macaulay modules”, *MSRI Workshop: “Noncommutative Algebraic Geometry and Representation Theory”*, MSRI, Berkeley CA, series of two one-hour lectures.
 - Jan. “What should a non-commutative desingularization be?”, *MSRI Workshop: “Connections for Women: Noncommutative Algebraic Geometry and Representation Theory”*, MSRI, Berkeley CA.
 - 2012 May “Maximal Cohen-Macaulay modules and non-commutative desingularizations”, *Pan-American Advanced Studies Institute (PASI) Commutative Algebra and Its Interactions with Algebraic Geometry, Representation Theory, and Physics*, Guanajuato, Mexico, mini-course of four one-hour lectures.
 - Apr. “The MCM McKay Correspondence”, *Maurice Auslander Distinguished Lectures and International Conference*, Woods Hole, MA.

- Mar. “Non-commutative desingularizations of determinantal varieties”, *AMS Special Session*, Lawrence, KS.
- 2011 Dec. “Non-commutative desingularizations of determinantal varieties”, *Winter Meeting of the Canadian Mathematical Society*, Toronto, ON, Canada.
- Nov. “The MCM McKay Correspondence”, *Northeastern University Representation Theory Seminar*, Boston, MA.
- Nov. “Non-commutative crepant resolutions”, *Northeastern University Colloquium*, Boston, MA.
- Oct. “Wild Hypersurfaces”, *AMS Special Session*, Lincoln, NE.
- Mar. “Wild Hypersurfaces”, *Homological Methods Seminar*, University of Toronto.
- 2010 Nov. “Wild Hypersurfaces”, *AMS Special Session*, Notre Dame, IN.
- Feb. “Wild Hypersurfaces”, *Mathematics Department Algebra Seminar*, University of Kansas, Lawrence, KS.
- 2009 Oct. “Semidualizing modules and Gorenstein presentations”, *AMS Special Session*, Boca Raton, FL.
- Jun. “Non-commutative desingularization of determinantal varieties”, *CIMPA-UNESCO-IPM School on Commutative Algebra and Applications to Combinatorics and Algebraic Geometry*, Tehran, Iran (cancelled for political reasons).
- Mar. “Semidualizing modules and Gorenstein presentations”, *AMS Special Session*, Urbana, IL.
- 2008 Dec. “Semidualizing modules and Gorenstein presentations”, *Winter Meeting of the Canadian Mathematical Society*, Ottawa, Ontario, Canada.
- Oct. “What should a non-commutative desingularization be?”, *Route 81 Conference #18*, Kingston, Ontario, Canada.
- Sep. “Non-commutative desingularization of determinantal varieties”, *Conference on interactions between representation theory and commutative algebra*, Barcelona, Spain.
- Sep. “What is a non-commutative desingularization?”, *Mathematics Department Colloquium*, University of Nebraska-Lincoln.
- Mar. “Non-commutative desingularizations of determinantal varieties”, *International Conference on Commutative Algebra*, Yokohama, Japan.

Teaching

- 2004–today **Syracuse University.**
 Elements of Modern Mathematics, Calculus I, II, and III, Differential Equations, Second Course in Linear Algebra, Applied Linear Algebra, Intro to Abstract Algebra, Senior Seminar in Mathematics, Graduate Algebra I and II, Homological Algebra, Commutative Algebra, Topics in Algebra: Combinatorial Commutative Algebra, Topics in Algebra: MCM Modules
- 2003–2004 **University of Toronto.**
 Calculus!
- 2000–2003 **University of Kansas.**
 Calculus I, Intro to Statistics, Special Topics: MCM Modules
- 1995–2000 **University of Nebraska–Lincoln.**
 College Algebra, Trigonometry, Precalculus, Recitations for Calculus I and II

Service to the Institution

Syracuse University Mathematics Department

- 2014–today **Associate Chair for Undergraduate Affairs.**
- 2012–today **Editor** of *“The Archimedean”*, departmental newsletter.
- 2008–today **Social Media co-Guru** (with *L. Kovalev*), maintain and cultivate department’s website and Facebook/Twitter presences.
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- 2006–2014 **Preparing Future Faculty/Future Professoriate Program** mentor for Wei Ning, Derek Gustafson, Thomas Bleier, and Dayal Dharmasena.
- 2009–2014 **Colloquium Chair.**
- 2013–2014 **Graduate Committee** (Chair).
- 2011–2012 **Ad Hoc Hiring Committee** to fill tenure-track position in Combinatorics.
- 2011–2012 **Ad Hoc Committee** for the tenure case of Lixin Shen.
- 2011–2012 **Executive Committee.**
- 2009–2011 **Graduate Committee** (Chair 2010–2011).
- 2006–2008 **Undergraduate Committee.**

PhD Preliminary Exam Administrator.

Jan 2007, Aug 2007, Jan 2009, Jan 2011, Jan 2012, Aug 2013, Aug 2014.

Specialty Exam Committees.

Adam McCaffrey, Thomas Bleier, Kosmas Diveris, Jeremy Entner

PhD Dissertation Defense Committees.

Markus Reitenbach, Sebastian Burciu, Philip Lynn, Allen Pelley, Christina Graves, Thomas Bleier, Marju Purin, Kosmas Diveris

Syracuse University College of Arts & Sciences

- 2010–2011 **Search Committee for Mathematics Department Chair** charged by Mathematics Department and Dean Langford to formulate and implement procedures to select new Chair.
- 2009–2010 **First-Year Advisor** help incoming first-year students from across the college.
- 2007–2008 **Curriculum Committee** supervise courses and curricular programs.

Other

- 2010–2014 **Faculty advisor** for SU Bowling Club.

Current PhD Students

Joshua Stangle *Syracuse University*, PhD expected Spring 2016.

Robert Roy *Syracuse University*.

Service to the Profession

Editorial

- 2001–today **co-Founder, Designer, and co-Webmaster** of *www.commalg.org*, with Moira McDermott and Sean Sather-Wagstaff. A website for the commutative algebra community, including conference announcements, news, and links of interest to commutative algebraists.
- 2007–today **Associate Editor** for *Journal of Commutative Algebra*.
- 2012–today **Associate Editor** for *Communications in Algebra*.

Conferences Organized

- 2013 Oct. **23rd annual Route 81 Conference on Commutative Algebra and Algebraic Geometry** with *S. P. Diaz and C. Miller*, Syracuse NY.
- 2012 Apr. **Interactions between Commutative Algebra and Representation Theory: A conference in honour of Ragnar-Olaf Buchweitz** with *S. Iyengar, C. Miller, and D. Zacharia*, Syracuse NY. Funded by the National Science Foundation.
- 2010 Oct. **AMS Special Session on Commutative Algebra and Algebraic Geometry (proxy for 20th Route 81 Conference)** with *A. Geramita, C. Miller, and M. Stillman*, Syracuse NY.
- 2010 Jan. **AMS Special Session on Commutative Algebra** with *S. Cooper and S. Sather-Wagstaff*, San Francisco CA.
- 2009 Oct. **19th Annual Route 81 Conference on Algebraic Geometry and Commutative Algebra** with *S. P. Diaz and C. Miller*, Syracuse NY.
- 2006 Dec. **CMS Special Session on Commutative Algebra and Algebraic Geometry** with *R.-O. Buchweitz and G. G. Smith*, Toronto, Ontario, Canada.
- 2006 Sep. **16th Annual Route 81 Conference on Algebraic Geometry and Commutative Algebra** with *S. P. Diaz and C. Miller*, Syracuse NY.
- 2005 Aug. **Minnowbrook Workshop on Commutative Algebra** with *S. Iyengar, C. Miller, and A. Singh*, Minnowbrook Adirondack Conference Center, NY. Funded by Syracuse University and the National Security Agency.
- 2004 May **AMS Special Session on Commutative Algebra** with *S. Iyengar*, Houston TX.
- 2001 Oct. **AMS Special Session on Commutative Algebra** with *S. Loepp*, Williamsown MA.

Other Service to the Mathematical Community

- 2013–2016 **AMS Committee on Meetings and Conferences** *Member at Large 2013–2014, Chair 2014–2016*.

ongoing **Referee** for the following journals.

- Acta Mathematica Sinica
- Advances in Mathematics
- Algebra and Representation Theory
- American Journal of Mathematics
- American Mathematical Monthly
- Arabian Journal of Mathematics
- Bulletin of the American Mathematical Society
- Bulletin of the Brazilian Mathematical Society
- Compositio Mathematica
- Czechoslovak Mathematical Journal
- Communications in Algebra
- Duke Mathematical Journal
- Forum Mathematicum
- Geometriae Dedicata
- Illinois Journal of Mathematics
- Indian Journal of Pure and Applied Mathematics
- International Mathematics Research Notices
- Inventiones Mathematicae
- Journal of Algebra
- Journal of Algebra and its Applications
- Journal of Software for Algebra and Geometry
- Journal of Pure and Applied Algebra
- Mathematica Scandinavica
- Mathematical Research Letters
- Mathematische Annalen
- Mathematische Zeitschrift
- Memoirs of the AMS
- Nagoya Mathematical Journal
- Osaka Journal of Mathematics
- Pacific Journal of Mathematics
- Proceedings of the American Mathematical Society
- Proceedings of the London Mathematical Society
- Rocky Mountain Journal of Mathematics
- Selecta Mathematica
- Transformation Groups

ongoing **Reviewer** for NSF and NSA grant proposals.

ongoing **Reviewer** for Mathematical Reviews, 45 articles.