MATTHEW MACAULEY

Associate Professor
Department of Mathematical Sciences
Clemson University
Clemson, SC, USA 29634-0975
macaule@clemson.edu

EDUCATION
Ph.D., Mathematics. University of California, Santa Barbara, 2008.
M.A., Mathematics. University of California, Santa Barbara, 2005.
B.S., Mathematics. Harvey Mudd College, 2003.

PROFESSIONAL APPOINTMENTS
Clemson University. Clemson, SC.
    Faculty member. Graduate Program in Environmental Toxicology. (2016-present)
    Associate Professor, Mathematical Sciences (2014-present).
    Assistant Professor, Mathematical Sciences Clemson
African Institute of Mathematical Sciences. Cape Town, WC, South Africa.
    Visiting Lecturer. March-April 2017, 2018.
National Taipei University of Technology. Taiwan.
    Visiting Lecturer. Summer 2017.
University of Southern Denmark. Odense, Denmark.
    Visiting Faculty. Fall 2014.
Institute for Systems Biology. Seattle, WA.
    Visiting Scientist. Summer 2009.
Virginia Bioinformatics Institute. Virginia Tech. Blacksburg, VA.
    Postdoctoral Associate. 2008.
    Research Associate. 2005-08.
University of California, Santa Barbara.
    Teaching Assistant / Associate. 2003-07.
Los Alamos National Laboratory. Los Alamos, NM.
    Graduate Research Associate. Summer 2003, 2004,

GRANT FUNDING
"Toric posets: theory and applications." Simons Foundation, Collaboration Grants for
    Mathematicians, Award #358242. Principal Investigator (sole PI), 2016-21 ($35,000).
NSF conference grant (Graduate Students Combinatorics Conference). Co-PI (PI Svetlana
    Poznanovikj), DMS-1600767, 2016–17 ($16,000).
"Analysis and stability of dynamical system models over networks." National Science Foundation
    (DMS, Applied Mathematics). Principal Investigator (sole PI), 2012-14 ($85,026).
"Algebra, Biology & Combinatorics." Simons Foundation, Collaboration Grants for
    Mathematicians, Award #246042. Principal Investigator (sole PI), 2012-17 ($35,000). Award
    terminated by PI upon receipt of NSF grant.

HONORS AND AWARDS
Clemson University Board of Trustees Award for Excellence, 2017-2018.
Project NExT Fellowship, Mathematical Association of America (2008-2009).
Mathematical Contest in Modeling. Highest distinction: "Outstanding," awarded to
    11/494 entries nationally (2003).
Chavin Prize for best senior thesis. Department of Mathematics, Harvey Mudd College
    (2003).

CLASSES TAUGHT
Calculus I (UCSB)
Calculus II (UCSB, Clemson, Taipei Tech)
Calculus for Life and Social Scientists (UCSB)
Multivariable Calculus (UCSB, Taipei Tech)
Differential Equations (UCSB, Clemson, Taipei Tech)
Linear Algebra (UCSB, Clemson, Taipei Tech)
Introduction to Statistics (Taipei Tech)
Advanced Engineering Mathematics (Clemson)
Theory of Probability (Clemson)
Abstract Algebra (Clemson)
Advanced Calculus I & II (Clemson)
Mathematical Modeling (Clemson)
Topics in Geometry (Clemson)
Topology (Clemson)
Algebraic Biology (African Institute of Mathematical Sciences)
Graduate Linear Algebra (Clemson)
Graduate Abstract Algebra I & II (Clemson)
Combinatorial Computational Biology of RNA (Clemson)

PUBLICATIONS
Books
1. R. Robeva and M. Macauley (editors). *Algebraic and combinatorial computational biology.* Academic Press, 2018 (forthcoming).

Refereed journal publications
1. A. Jenkins[grad] and M. Macauley. Bistability and asynchrony in a Boolean model of the L-arabinose operon in Escherichia coli. *Bull. Math. Biol.* **79**(8) (2017): 1778-1795.
2. D. Einstein, M. Farber[grad], E. Gunawan, M. Joseph[grad], M. Macauley, J. Propp, and S. Rubinstein-Salzedo. Noncrossing partitions, toggles, and homomesies. *Electron. J. Combin.* **23**(3) (2016) #P3.52, 26pp.
3. Q. He[grad] and M. Macauley. Stratification and enumeration of Boolean functions by canalizing depth. *Physica D* **314** (2016), 1–8.
4. M. Macauley. Morphisms and order ideals of toric posets. *Mathematics* **4**(2), (2016). 31 pages.
5. M. Chan, D. Glass, M. Macauley, D. Perkinson, C. Werner, and Q. Yang[ugrad]. Sandpiles, spanning trees, and plane duality. *SIAM J. Discrete Math.* 29(1), (2015), 461–471..
6. M. Develin, M. Macauley, and V. Reiner. Toric partial orders. *Trans. Amer. Math. Soc.* **368** (2016), 2263–2287.
7. M. Macauley and H.S. Mortveit. An atlas of limit set dynamics for asynchronous elementary cellular automata. *Theor. Comput. Sci.* **504**, 26-37 (2013).
8. M. Macauley, B. Rabern[grad], and L. Rabern[grad]. "Dangerous reference graphs and semantic paradoxes." *J. Philos. Logic.* **41**(5), 727-765 (2013).
9. T. Boothby[grad], J. Burkert[ugrad], M. Eichwald[ugrad], D.C. Ernst, R.M. Green, and M. Macauley. "On the cyclically fully commutative elements of Coxeter groups." *J. Algebraic Combin.* **36**(1), 123-148, (2012).
10. L. Layne[grad], E. Dimitrova, and M. Macauley. "Nested canalyzing depth and network stability." *Bull. Math. Biol.* **74**(2), 422-433 (2012).
11. M. Macauley and H.S. Mortveit. "Posets from admissible Coxeter sequences." *Electron. J. Combin.* **18**(1), #R197, 18 pp. (2011).

12. M. Macauley and H.S. Mortveit. "Update sequence stability in graph dynamical systems." *Discrete Cont. Dyn. Sys. Ser. S,* **4**, 1533-1542 (2011).
13. M. Macauley, J. McCammond, and H.S. Mortveit. "Dynamics groups of asynchronous cellular automata." *J. Algebraic Combin.* **33**(1), 31-55 (2011).
14. E. Goldstein, A. Apolloni, B. Lewis[grad], J. Miller, M. Macauley, S. Eubank, M. Lipsitch, and J. Wallinga. "Distribution of vaccine / anitvirals and the 'least spread line' in a stratified population." *J. Royal Soc. Interface*, **7**, 755-764 (2010).
15. M. Macauley and H.S. Mortveit. "Coxeter groups and asynchronous cellular automata." *Lect. Notes Comput. Sci.* **6350**, 409-418 (2010).
16. M. Macauley and H.S. Mortveit. "Cycle equivalence of graph dynamical systems." *Nonlinearity,* **22**, 421-436 (2009).
17. V.S.A. Kumar, M. Macauley, and H.S. Mortveit. "Limit set reachability in asynchronous graph dynamical systems." *Lect. Notes Comput. Sci.* **5796**, 217-232 (2009).
18. J. Chen, M. Macauley, and A. Marathe. "Network topology and locational market power." *Comput. Econ.* **34**, 21-35 (2009).
19. K. Atkins, J. Chen, A. Kumar, M. Macauley, and A. Marathe. "Locational market power in network constrained markets." *J. Econ. Behav. Organ.* **70**, 416-430 (2009).
20. M. Macauley and H.S. Mortveit. "On enumeration of conjugacy classes of Coxeter elements." *Proc. Amer. Math. Soc.* **136**, 4157-4165 (2008).
21. M. Macauley, J. McCammond, and H.S. Mortveit. "Order independence in asynchronous cellular automata." *J. Cell. Autom.* **3**, 37-56 (2008).

Refereed conference proceedings
1. M. Macauley and H.S. Mortveit. "An atlas of limit set dynamics for asynchronous elementary cellular automata." *Proceedings of the 20th International Workshop, AUTOMATA 2014.* Himeji, Japan, pp. 64-76 (July 2014).
2. M. Macauley and G. Thomas[grad]. "Analysis and dynamics of bi-threshold functions." *Proceedings of the 20th International Workshop, AUTOMATA 2014.* Himeji, Japan, pp. 170-177 (July 2014).
3. J. Chen, M. Macauley, and A. Marathe. "Role of network and production capacity in allocating market power." *Proceedings of the Trans-Atlantic INFRADAY Conference on Applied Infrastructure Modeling and Policy Analysis*. University of Maryland. College Park, MD (November 2007).
4. K. Atkins, J. Chen, A. Kumar, M. Macauley, and A. Marathe. "Locational market power in network constrained markets." Proceedings of the 29th IAEE International Conference. Potsdam, Germany (June 2006).

Book chapters
1. M. Macauley and B. Stigler. "Inferring interactions in molecular networks via primary decompositions of monomial ideals." In *Algebraic and combinatorial computational biology*. Eds., R. Robeva and M. Macauley. Academic Press, 2018 (forthcoming).
2. M. Macauley, A. Jenkins, and R. Davies. "The regulation of gene expression by operons and the local modeling framework." In *Algebraic and combinatorial computational biology*. Eds., R. Robeva and M. Macauley. Academic Press, 2018 (forthcoming).
3. A. Jenkins[grad] and M. Macauley. "Section 20.4, Genome Assembly." In *CRC Handbook for Discrete Mathematics*, Ed.: K. Rosen. CRC Press, 2017.
4. Q. He[grad], M. Macauley, and S. Poznanovikj. "Section 20.5, RNA Folding." In *CRC Handbook for Discrete Mathematics*, Ed.: K. Rosen. CRC Press, 2017.
5. Q. He[grad], M. Macauley, and R. Davies. "Dynamics of complex Boolean networks: canalization, stability, and criticality." In *Algebraic and discrete mathematical methods for modern biology*. Eds., R. Robeva. Academic Press, 2015.

6. Q. He[grad], M. Macauley, and R. Davies. "RNA secondary structure: combinatorial models and folding algorithms." In *Algebraic and discrete mathematical methods for modern biology*. Eds., R. Robeva. Academic Press, 2015.

PRESENTATIONS

Invited colloquia

1. *University of Cape Town*. Department of Mathematics. Colloquium. Cape Town, WC, South Africa. March 2018.
2. *University of the Western Cape*. Department of Mathematics. Colloquium. Bellville, WC, South Africa. April 2017.
3. *Stellenbosch University*. Department of Mathematical Sciences. Colloquium. Stellenbosch, WC, South Africa. April 2017.
4. *University of Southern Denmark*. Department of Mathematics and Computer Science (IMADA). Odense, Denmark (November 2014).
5. *University of Turku*. Department of Mathematics and Statistics. Turku, Finland (October 2014)
6. *Northern Arizona University*. Department of Mathematics and Statistics. Flagstaff, AZ (April 2014).
7. *Plymouth State University*. Department of Mathematics. Plymouth, NH (April 2011).
8. *Johns Hopkins University*. Department of Applied Mathematics and Statistics. Baltimore, MD (April 2010).
9. *Clemson University*. Department of Mathematical Sciences. Clemson, SC (October, 2007).

Invited conference presentations

1. International Symposium on Biomathematics and Ecology Education and Research (BEER). College of Charleston, SC. October 2016.
2. SIAM Conference on the Life Sciences. Minisymposium: "Combinatorics and algebra in biological structures." Boston, MA. July 2016.
3. AMS Sectional Meeting. Special session: Topological combinatorics. University of Memphis, TN. October 2015.
4. Automata 2014 (2 talks). Himeji, Japan (July 2014).
5. Saganfest (Bruce Sagan's 60th birthday conference). University of Florida. Gainesville, FL (April 2014).
6. Workshop for Young Researchers in Mathematical Biology. Mathematical Biosciences Institute, Ohio State University. Columbus, OH (August 2013).
7. Special session on Applications to the Life and Physical Sciences. SIAM meeting on Applied Algebraic Geometry. Colorado State University. Fort Collins, CO (August 2013).
8. Special session on Algebraic and Geometric Combinatorics. AMS Central Sectional meeting. Iowa State University. Ames, IA (April 2013).
9. Special session on Discrete Methods and Models in Mathematical Biology." AMS Central Sectional meeting. Iowa State University. Ames, IA (April 2013).
10. Special session on Mathematical Models of Complex Biological Systems. International Symposium on Biomathematics and Ecology Education and Research. St. Louis, MO (November 2012).
11. Special session on Algebraic and Combinatorial Aspects of Mathematical Biology. SIAM Annual Meeting. Minneapolis, MN (July 2012).
12. Mini Conference—Research and Collaboration Forum for Southeastern Researchers in Mathematical Modeling of Biological Systems. Georgia Health Sciences University. Augusta, GA (March 2012).

13. Special session on Combinatorics of Coxeter Groups. AMS Eastern Sectional meeting. College of the Holy Cross. Worcester, MA (April 2011).
14. Budapest Semesters in Mathematics 25th Anniversary Reunion and Conference. Alfréd Rényi Institute of Mathematics. Budapest, Hungary (June 2010).
15. 41st Southeastern International Conference on Combinatorics, Graph Theory, and Computing. Florida Atlantic University. Boca Raton, FL (March 2010).
16. AMS Central Sectional meeting. Baylor University. Waco, TX (October, 2009).
17. Reachability Problems 2009. École Polytechnique. Palaiseau, France (September, 2009).
18. AMS/SMS Joint Mathematics Meetings (Contributed paper). Washington, DC (January, 2009).
19. AMS/SMS Joint Meeting (2 talks). Shanghai, China (December, 2008).
20. Automata 2007. The Fields Institute. Toronto, Ontario (August, 2007).

Seminar talks
1. University of Kentucky, Department of Mathematics. Applied mathematics seminar. October 2016.
2. University of Kentucky, Department of Mathematics. Discrete CATS seminar. October 2016.
3. Research Seminar. Icelandic Centre of Excellence in Theoretical Computer Science (ICE-TCS). Reykjavik University. Reykjavik, Iceland. (November 2014).
4. Combinatorics Seminar. Northern Arizona University. Flagstaff, AZ (March 2014).
5. Algebra Seminar, University of Georgia. Athens, GA (April 2013).
6. Discrete Mathematics Seminar, Georgia Southern University. Statesboro, GA (April 2012).
7. Combinatorics Seminar, Dartmouth College. Hanover, NH (April 2011).
8. Algebraic Lie Theory Seminar, University of Colorado. Boulder, CO (November 2010).
9. Algebra Seminar, Virginia Tech. Blacksburg, VA (March 2010).
10. Algebra and Combinatorics seminar, North Carolina State University. Raleigh, NC (February 2010).
11. Combinatorics Seminar, University of Washington. Seattle, WA (June, 2009).
12. Senior Seminar, University of North Carolina. Asheville, NC (February 2009).
13. Algebra and Discrete Mathematics Seminar, Clemson University. Clemson, SC (4 times from 2009-14).
14. Algebra Seminar, Virginia Tech. Blacksburg, VA (March 2008).

STUDENT ADVISING
Graduate student advising (primary advisor)
Sandra Annie Tsiorintsoa (MSc). "Pseudomonomials in algebraic biology." African Institute for Mathematical Sciences. June 2018 (expected).
Qijun He (Ph.D). "Algebraic geometry and combinatorics of partially nested canalyzing functions." May 2016. First job: Biocomplexity Institute at Virginia Tech (postdoc).
Andy Jenkins (M.S.) "A Boolean model of the L-arabinose operon in E. coli". May 2016.
Shihwei Chao (Ph.D.). "Cyclic reducibility in Coxeter Groups." August 2014. First job: University of North Georgia (tenure-track).
Qijun He (M.S.). "Some new combinatorial problems from RNA." December 2012.
Grady Thomas (M.S.). "Dynamics of Bi-threshold Graph Dynamical Systems." May 2012.
Chris Wilson (M.S.). "Backward Bifurcations in Epidemiological Models." Co-advised with Jan Medlock. May 2012.

Undergraduate student advising
Garrick Stott. Fall 2016.

Daniel Christensen. Spring 2016, Fall 2016.
Andrew Bell. Fall 2015.
Kelly Rigsbee. Summer 2015, Fall 2016.
James Stevens. Summer 2014. Supported by NSF grant.
Timothy Downing. 2012-13. Supported by NSF grant.

Thesis Committees Served (defense date given)
Ian Eduland (Ph.D., Environmental Toxicology). Expected 2018. Advisor: C. Lee.
Kara Stasikelis (Ph.D.), Expected April 2018. Advisor: S. Poznanovikj.
Amy Grady (Ph.D.), Expected April 2018, and (M.S.), April 2014. Advisor: S. Poznanovikj
Brandon Goodell (Ph.D), April 2017. Advisor: J, Coykendall.
Sherli Koshy Chenthittayil (Ph.D), April 2017, and (M.S.), May 2017. Advisor: E. Dimitrova.
Thomas Jiaxian Li (Ph.D.), February 2015. Advisor: C.M. Reidys (U. Southern Denmark).
Praveen Nalla (M.S.), December 2013. Advisor: E. Dimitrova.
Sher Chhetri (M.S.), July 2012. Advisor: T. Khan.
Ryan Harper (M.S.), April 2012. Advisor: E. Dimitrova / J. Medlock.
Margeaux Evans (M.S.), April 2012. Advisor: E. Dimitrova / J. Medlock.
Kaitlin Woskoff (M.S.), April 2012. Advisor: E. Dimitrova.
Nate Black (Ph.D.), April 2010, and (M.S.), July 2014. Advisor: S. Gao.
Lori Layne (Ph.D.) April 2011, and (M.S.), December 2009. Advisor: E. Dimitrova.
Frank Volny (Ph.D.), April 2011, and (M.S.), July 2009. Advisor: S. Gao.
Justin Peachey (M.S.), April 2009. Advisor: G. Matthews.

DEPARTMENTAL SERVICE
Mathematical Sciences Department chair search committee, 2016-18.
Mathematical Sciences Undergraduate Affairs committee, 2016-18.
Faculty advisor of four undergraduates participating in the inaugural 2015 CRP: Collaborative
    Research Program. March 2015.
Faculty advisor of two 3-person undergraduate teams competing in the 2015 MCM: Mathematical
    Contest in Modeling. February 2015.
Organizer: Algebra and Discrete Mathematics seminar. Clemson University, 2011-13.
Clemson Calculus Challenge volunteer. Proctor (2012, 2014) and problem writer (2013).
Departmental representative, UCSB Graduate Student Association, 2006-07.
Organizer: UCSB Graduate Student Mathematics Seminar, 2004-06)

UNIVERSITY SERVICE
Council on Global Engagement, 2018-present.
General Education Committee, 2018-present.
Faculty Senator, 2015-2019.
Faculty Senate Secretary, 2018-19.
Lead Faculty Senator to the College of Science, 2017-18.
Clemson University Grievance Board member. 2018-20.
ScienceForward leadership team, responsible for developing the Strategic Plan for the College of
    Science. Invited by Dean Cynthia Young, 2017-18.
Faculty Senate Finance Committee, 2016-17.
University Diversity and Inclusion Committee, 2016-17.
Faculty Senate Scholastic Policy Committee, 2015-16.
College of Science representative to the Clemson Athletic Council, 2016-present.
College of Engineering and Science representative (alternate) to the Clemson Athletic Council,
    2014-16.

Accompanied 12 undergraduate engineering students (10 from Clemson) on a study-abroad trip to Trier University of Applied Sciences, in Trier, Germany. Official instructor of record of two classes: IS 210 and BE 440. Summer Session I, 2010.

SERVICE TO THE PROFESSION

Co-organizer (with John Jungck and Raina Robeva): Investigative Workshop on "*Algebraic Mathematical Biology*" at the National Institute for Mathematical and Biological Synthesis (NIMBioS) at the University of Tennessee. July 2016.

Co-organizer (with Terrell Hodge and Raina Robeva): Tutorial on "*Algebraic and Discrete Mathematical Biology for Undergraduate courses*." National Institute for Mathematical and Biological Synthesis (NIMBioS) at the University of Tennessee. Knoxville, TN. June 2014.

Co-organizer (with Brandilyn Stigler): Special session on "*Applications to the life and physical sciences*." SIAM conference on Applied Algebraic Geometry. Colorado State University. Fort Collins, CO. August 2013.

Co-organizer (with Terrell Hodge and Raina Robeva): Workshop on *"Teaching Discrete and Algebraic Mathematical Biology to Undergraduates*." Mathematical Biosciences Institute at Ohio State University. Columbus, OH. July 2013.

Co-organizer (with Dana Ernst): Special session on "*Combinatorics of Coxeter groups*." Spring 2011 AMS Sectional meeting, College of the Holy Cross, Worcester, MA. April 2011.

Co-author: Algebra and Discrete Mathematics graduate preliminary exam. Many semesters.

Co-organizer: Workshop on "How to establish and fund interdisciplinary research collaborations." AMS/MAA Joint Mathematics Meetings. Washington, DC. January, 2009.

Referee: Australas. J. Combin,; BioSystems; Bull. Math. Biol (x4); Discrete Appl. Math.; Discrete Contin. Dyn. Syst. Ser. B; Discrete Contin. Dyn. Syst. Ser. S, Discrete Math.; Discrete Optim.; Entropy, Eur. J. Combin. (x2); IEEE Trans. Inf. Theory; J. Algebraic Combin.; J. Combin. Math. Combin. Comput.; J. Phys. A: Math. Theor.; Linear Algebra Appl.; Open J. Discrete Math.; Phys. Rev. E; Phys. Rev. Lett.; Physica D (x2); SIAM J. Appl. Dyn. Syst.; Theor. Comput. Syst.; Theor. Comput. Sci. (x2).

Research advisor (volunteer), NSF Research Experiences for Undergraduates in Pure and Applied Mathematics, University of Washington. Summer 2009.

Updated May 3, 2018.