Matthew Macauley

CONTACT INFORMATION	Department of Mathematical Sciences O-325 Martin Hall Clemson, SC 29634 (864) 656-1838	*Email*: macaule[at]clemson.edu *Website*: http://www.clemson.edu/~macaule/ *Date of birth*: March 12, 1981 *Citizenship*: USA

RESEARCH INTERESTS

Discrete, finite dynamical systems. Discrete models of biological systems. Algebraic and geometric combinatorics. Combinatorial Coxeter theory, in particular, cyclic reducibility and conjugacy.

POSITIONS

Clemson University, Clemson, SC
Department of Mathematical Sciences

Associate Professor **2014–present**

Assistant Professor **2008–2014**

University of Southern Denmark, Odense, Denmark
Department of Mathematics and Computer Science
Visitor (Sabbatical. Sponsor: Christian Reidys) **Fall 2014**

Institute for Systems Biology, Seattle, WA
Visiting Scientist (Sponsor: Ilya Shmulevich) **Summer 2009**

Virginia Bioinfomatics Institute (at Virginia Tech), Blacksburg, VA
Network Dynamics and Simulation Science and Laboratory **Summer 2005, 2006, 2007**
Research Associate (Sponsor: Chris Barrett) **and 2007–2008**

University of California, Santa Barbara, CA
Department of Mathematics
Teaching Assistant / Associate **2003–2007**

Los Alamos National Laboratory, Los Alamos, NM
Modeling, Algorithms and Informatics Group (CCS-3)
Graduate Research Assistant **Summer 2003, 2004**

EDUCATION

University of California, Santa Barbara. Mathematics (Ph.D. 2008 & M.A. 2005)

Harvey Mudd College. Mathematics (B.S., 2003)

Budapest Semesters in Mathematics (Spring 2002).

GRANT FUNDING

- Simons Foundation Collaboration Grant for Mathematicians, Award #358242, 2016–21 ($35,000).
- NSF conference grant (*Graduate Students Combinatorics Conference*). Co-PI (PI Svetlana Poznanovikj), DMS-1600767, 2016–17 ($16,000).
- NSF Research Grant, DMS-1211691, 2012–14 ($85,027).
- Simons Foundation Collaboration Grant for Mathematicians, Award #246042, 2012–17 ($35,000). Award terminated upon receipt of NSF grant.

HONORS AND AWARDS

- Project NExT Fellow, Mathematical Association of America, 2008–09.

- IAEE International Conference Student Scholarship, to attend the 2006 IAEE conference in Potsdam, Germany.
- 2003 Mathematical Contest in Modeling. Awarded distinction of "outstanding" (top 11 of 494 teams that entered).
- 2003 Chavin Prize for best senior thesis. Department of Mathematics, Harvey Mudd College.

PUBLICATIONS

- A. Jenkins and M. Macauley. **Synchrony in a Boolean network model of the L-arabinose operon in *Escherichia coli***. *Bull. Math. Biol.*, (2017), to appear. q-bio.MN/1611.02656.

- D. Einstein, M. Farber, E. Gunawan, M. Joseph, M. Macauley, J. Propp, and S. Rubinstein-Salzedo. **Noncrossing partitions, toggles, and homomesies**. *Electron. J. Combin.*, (2016). **23**(3) #P3.52, 26pp.

- M. Macauley. **Morphisms and order ideals of toric posets**. *Mathematics* **4**(2), (2016). 31 pages.

- Q. He and M. Macauley. **Stratification and enumeration of Boolean functions by canalizing depth**. *Physica D* **314** (2016), 1–8.

- M. Develin, M. Macauley, and V. Reiner. **Toric partial orders**. *Trans. Amer. Math. Soc.* **368** (2016), 2263–2287.

- M. Chan, D. Glass, M. Macauley, D. Perkinson, C. Werner, and Q. Yang. **Sandpiles, spanning trees, and plane duality**. *SIAM J. Discrete Math.* **29**(1), (2015), 461–471.

- Q. He, 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.

- Q. He, M. Macauley, and R. Davies. **RNA secondary structures: combinatorial models and folding algorithms**. In *Algebraic and discrete mathematical methods for modern biology*. Eds., R. Robeva. Academic Press, 2015.

- M. Macauley and H.S. Mortveit. **Cycle equivalence of finite dynamical systems containing symmetries**. Proceedings of 20th International Workshop, AUTOMATA 2014, Himeji, Japan (2014), pp. 64–76.

- M. Macauley and G. Thomas. **Analysis and dynamics of bi-threshold functions**. Proceedings of 20th International Workshop, AUTOMATA 2014, Himeji, Japan (2014), pp. 170–177.

- M. Macauley and H.S. Mortveit. **An atlas of limit set dynamics for asynchronous elementary cellular automata**. *Theor. Comput. Sci.* **504** (2013), 26–37.

- B. Rabern, L. Rabern, and M. Macauley. **Dangerous reference graphs and semantic paradoxes**. *J. Philos. Logic.* **42** (2013), 727–765.

- T. Boothby, J. Burkert, M. Eichwald, D.C. Ernst, R.M. Green, and M. Macauley. **On the cyclically fully commutative elements of Coxeter groups**. *J. Algebraic Combin.* **36**(1) (2012), 123–148.

- L. Layne, E. Dimitrova, and M. Macauley. **Nested canalyzing depth and network stability**. *Bull. Math. Biol.* **74**(2) (2012), 422–433.

- M. Macauley and H.S. Mortveit. **Posets from admissible Coxeter sequences**. *Electron. J. Combin.* **18**(1) (2011) #P197, 18pp.

- M. Macauley, J. McCammond, and H.S. Mortveit. **Dynamics groups of asynchronous cellular automata**. *J. Algebraic Combin.* **33** (2011), 31–55.

- M. Macauley and H.S. Mortveit. **Update sequence stability in graph dynamical systems**. *Discrete Cont. Dyn. Sys. Ser. S* **4** (2011), 1533–1542.

- M. Macauley and H.S. Mortveit. **Coxeter groups and asynchronous cellular automata**. *Lect. Notes Comput. Sci.* **6350** (2010), 409–418.

- E. Goldstein, A. Apolloni, B. Lewis, J. Miller, M. Macauley, S. Eubank, M. Lipsitch, J. Wallinga. **Distribution of vaccine / antivirals and the "least spread line" in a stratified population**. *J. Royal Soc. Interface* **7** (2010), 755–764.

- M. Macauley and H.S. Mortveit. **Cycle equivalence of graph dynamical systems**. *Nonlinearity* **22** (2009), 421–436.

- V.S.A. Kumar, M. Macauley, and H.S. Mortveit. **Limit set reachability in asynchronous graph dynamical systems**. *Lect. Notes Comput. Sci.* **5796** (2009), 217–232.

- K. Atkins, J. Chen, A. Kumar, M. Macauley, and A. Marathe. **Locational market power in power markets**. *J. Econ. Behav. Organ.* **70** (2009), 416–430.

- J. Chen, M. Macauley, and A. Marathe. **Network topology and locational market power**. *Comput. Econ.* **34** (2009), 21-35.

- M. Macauley and H.S. Mortveit. **On enumeration of conjugacy classes of Coxeter elements**. *Proc. Amer. Math. Soc.* **136** (2008), 4157–4165.

- M. Macauley, J. McCammond, and H.S. Mortveit. **Order independence in asynchronous cellular automata**. *J. Cell. Autom.* **3** (2008), 37–56.

- 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.* College Park, MD. November, 2007.

- K. Atkins, J. Chen, A. Kumar, M. Macauley, and A. Marathe. **Locational market power in power markets**. *Proceedings of the 29th IAEE International Conference.* Potsdam, Germany, June 2006.

- K. Atkins, C.L. Barrett, R. Beckman, K. Bisset, J. Chen, S. Eubank, B. Lewis, M. Macauley, A. Marathe, M. Marathe, H.S. Mortveit, and P. Stretz. **Simulated pandemic influenza outbreaks in Chicago: NIH DHHS study final report**. *NDSSL Internal Report No. 06-023*, 2006.

- M. Macauley. **The mathematics of juggling** (Book review). *Math Horizons*, February 2004.

- M. Banister, M. Macauley, and M. Smukler. **Thinking outside the box, and over the elephant**. *UMAP Journal* **24** (2003).

TALKS

- University of the Western Cape. Department of Mathematics. Colloquium. Bellville, South Africa. April 2017.
- Stellenbosch University. Department of Mathematical Sciences. Colloquium. Stellenbosch, South Africa. April 2017.
- University of Kentucky, Department of Mathematics. Two talks: Applied mathematics seminar, and Discrete CATS seminar. October 2016.
- International Symposium on Biomathematics and Ecology Education and Research (BEER). College of Charleston, SC. October 2016.
- SIAM Conference on the Life Sciences. Minisymposium: "Combinatorics and algebra in biological structures." Boston, MA. July 2016.
- AMS Sectional Meeting. Special session: Topological combinatorics geometry. University of Memphis, TN. October 2015.
- University of Southern Denmark, Department of Mathematics and Computer Science. Department Colloquium. Odense, Denmark. November 2014.
- Reykjavik University, Icelandic Centre of Excellence in Theoretical Computer Science (ICE-TCS). Research Seminar. Reykjavik, Iceland. November 2014.
- University of Turku, Department of Mathematics and Statistics. Department Colloquium. Turku, Finland. October 2014.
- Automata 2014. Two talks. Himeji, Japan. July 2014.
- NIMBioS Tutorial: Algebraic and Discrete Biological Models for Undergraduate Courses. Three talks. University of Tennessee. Knoxville, TN. June 2014.

- Northern Arizona University, Department of Mathematics and Statistics. Two talks: Combinatorics Seminar, and Department Colloquium. Flagstaff, AZ. April 2014.
- Saganfest (Bruce Sagan's 60th birthday conference). Gainsville, FL. March 2014.
- Workshop for Young Researchers in Mathematical Biology. Mathematical Biosciences Institute at the Ohio State University. Columbus, OH. August 2013.
- SIAM Conference on Applied Algebraic Geometry (AG13). Special session: Applications to the Life and Physical Sciences. Fort Collins, CO. August 2013.
- AMS Sectional Meeting. Special sessions (x2): Discrete methods and models in mathematical biology, and Algebraic and Geometric Combinatorics. Iowa State University. Ames, IA. April 2013.
- University of Georgia, Department of Mathematics. Algebra Seminar. Athens, GA. April 2011.
- International Symposium on Biomathematics and Ecology Education and Research (BEER). St. Louis, MO. November 2012.
- SIAM Annual Meeting. Special session: Algebraic and Combinatorial Aspects of Mathematical Biology. Minneapolis, MN. July 2012.
- Georgia Southern University, Mathematical Sciences Department. Combinatorics seminar. Statesboro, GA. April 2012.
- Miniconference–Research and Collaboration Forum for Southeastern Researchers in *Mathematical Modeling of Biological Systems*. Georgia Health Science University. Augusta, GA. March 2012.
- AMS Sectional Meeting. Special session: Combinatorics of Coxeter groups (co-organizer). College of the Holy Cross. Worcester, MA. April 2011.
- Plymouth State University, Department of Mathematics. Department seminar. Plymouth, NH. April 2011.
- Dartmouth College, Department of Mathematics. Combinatorics seminar. Hanover, NH. April 2011.
- University of Colorado, Department of Mathematics. Algebraic Lie Theory Seminar. Boulder, CO. November 2010.
- Alfréd Rényi Institute of Mathematics. Budapest Semesters in Mathematics 25th anniversary reunion and conference. Budapest, Hungary. June 2010.
- Johns Hopkins University, Department of Applied Mathematics and Statistics. Colloquium. Baltimore, MD. April 2010.
- 41st Southeastern International Conference on Combinatorics, Graph Theory, and Computing. Florida Atlantic University. Boca Raton, FL. March 2010.
- Nort Carolina State University, Department of Mathematics. Algebra and combinatorics seminar. Raleigh, NC. February 2010.
- AMS Sectional Meeting. Special session: Applicable algebraic geometry. Baylor University. Waco, TX. October, 2009.
- Reachability Problems 2009. École Polytechnique. Palaiseau, France. September, 2009.
- University of Washington, Department of Mathematics. Combinatorics seminar. Seattle, WA. June 2009.
- University of North Carolina, Asheville, Department of Mathematics. Senior research seminar. Asheville, NC. January 2009.
- Joint AMS-MAA meeting. Contributed paper. Washington, DC. January, 2009.
- Joint AMS-SMS meeting. Special sessions (x2): Combinatorics and Discrete Dynamical Systems, and Biomathematics. Fudan University. Shanghai, China. December 2008.
- Clemson University, Department of Mathematical Sciences Algebra and Discrete Mathematics Seminar. Clemson, SC. November 2008, January 2009, March 2012.
- Virginia Tech, Department of Mathematics. Algebra Seminar. Blacksburg, VA. March 2008, March 2010.
- Trans-Atlantic INFRADAY Conference on Applied Infrastructure Modeling and Policy Analysis. College Park, MD. November 2007.
- Automata 2007. Fields Institute. Toronto, ON, Canada. August 2007.
- Virginia Tech, Department of Mathematics. SIAM Student Research Seminar. Blacksburg, VA. September 2005, September 2006, September 2007.
- IAEE International Conference. Potsdam, Germany. June 2006.
- UCSB, Department of Mathematics. Discrete Geometry and Combinatorics Seminar. Santa Barbara,

CA. March 2005, May 2005, October 2006, May 2007.
- Los Alamos National Laboratory, Basic and Applied Simulation Science group (CCS-5) seminar. Los Alamos, NM. August 2004.
- Los Alamos Student Symposium. Los Alamos, NM. August 2003.
- Joint AMS-MAA meeting. Contributed paper. Baltimore, MD. January 2003.

UNIVERSITY
SERVICE
- Member: Undergradate affairs committee (departmental). 2016–17.
- Faculty advisor: Mathematical Contest in Modeling. 2015, 2016.
- Clemson University Faculty Senator (2015–present). Committees:
  - Scholastic policies committee, 2015–2016.
  - Ad hoc committee on diversity and inclusion, 2016–present.
- Clemson University Athletic Council representative (2014–present). Committees:
  - Goverance & rules committee (chair), 2016–2016.
  - Goverance & rules committee, 2014–2015.
- Organizer: Clemson University Algebra and Discrete Mathematics seminar (2011–2013).
- Coauthor: Algebra and Discrete Mathematics graduate preliminary exam (numerous semesters).

OTHER SERVICE
- Program committee: The 29th international conference on Formal Power Series and Algebraic Combinatorics (FPSAC 2017). London, UK.
- 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 Robin Davies, Terrell Hodge and Raina Robeva): Tutorial on *Algebraic and Discrete Biological Models for Undergraduate Courses* at the National Institute for Mathematical and Biological Synthesis (NIMBioS) at the University of Tennessee. (June 2014).
- Co-organizer: Special session on *Applications to the Life and Physical Sciences.* SIAM Conference on Applied Algebraic Geometry (AG13). 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. (Summer 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).
- Accompanied 12 undergraduate engineering students (10 from Clemson) on a study-abroad trip to Trier University of Applied Sciences, in Trier, Germany, during Summer Session I, 2010. Official instructor of record of two classes: IS 210 and BE 440.
- Co-organizer: Workshop on "How to establish and fund interdisciplinary research collaborations." AMS/MAA Joint Mathematics Meetings. Washington, DC (January, 2009).

GRADUATE
STUDENT
ADVISING
- Shihwei Chao. PhD, August 2015. First job: University of North Georgia (tenure-track).
- Qijun He. PhD, August 2016. First job: Biocomplexity Institute of Virginia Tech (postdoc).
- Andy Jenkins. MS, May 2016.
- Qijun He. MS, December 2012.
- Grady Thomas. MS, May 2012.
- Chris Wilson (co-advised with Jan Medlock). MS, May 2012.

THESIS
COMMITTEES
- Kara Stasikelis. PhD, May 2018 (expected).
- Sherli Koshy Chenthittayil. MS, December 2015. PhD, May 2017 (expected).
- Brandon Goodell. PhD, May 2017 (expected).
- Thomas Jiaxian Li (University of Southern Denmark). PhD, February 2015.
- Praveen Nalla. MS, December 2013.
- Sher Chhetri. MS, August 2013.
- Kaitlin Woskoff. MS, May 2012.
- Margeaux Evans. MS, May 2012.

- Ryan Harper. MS, May 2012.
- Lori Layne. MS, December 2009. PhD, May, 2011.
- Frank Volny. MS, August 2009. PhD, May 2011.
- Justine Hyde-Volpe. MS, August 2010.
- Nate Black. MS, May 2010.
- Justin Peachey. MS, May 2009.

UNDERGRAD
RESEARCH
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)
- Timothy Downing (Fall 2012, Spring 2013, Summer 2013)

COMPUTER
SKILLS

- Languages: C, C++, Python, some use of Unix shell scripts.
- Applications: Sage, MAPLE, Matlab, Boost Graph Library, LaTeX, gnuplot, R.
- Operating Systems: UNIX/Linux, Mac OS, Windows.