DR. DANNY RORABAUGH

Post-Doctoral Research Associate
Global Computing Laboratory
University of Tennessee, Knoxville

EDUCATION

University of South Carolina, Columbia
Ph.D. in Mathematics
Advisor: Joshua Cooper
Research Area: Discrete Mathematics
Graduated: August 2015

Seattle Pacific University, Seattle
B.S. in Mathematics
Advisor: Robbin O'Leary
B.A. in Linguistics with Spanish Emphasis
Advisor: Kathryn Bartholomew
Graduated Summa Cum Laude: June 2010

TEACHING EXPERIENCE

Tutorial Presenter — 12 November 2018
Introduction of Practical Approaches to Data Analytics for HPC with Spark — *SC18, Dallas*

Adjunct Assistant Professor — September 2015 – December 2017
Department of Mathematics and Statistics — *Queen's University, Kingston*

Instructor of Record for five terms:
- · Differential and Integral Calculus (MATH 121/124): Fall 2015 – Fall 2017
- · Differential Equations for Electrical and Computer Engineers (MTHE 235): Fall 2015
- · Graph Theory (MATH 401/801): Fall 2016

Instructor — July – August 2017
A-Star Summer Math Camp — *Santa Clara, CA; Weston, MA*

Instructor for two 3-week camps
Taught interactive classes of 3-18 students for 30 hours each week
Prepared students from grades 3 through 10 for Mathcounts and AMC contests
Edited lessons and questions for future camps

Graduate Teaching Assistant — August 2010 – May 2015
Department of Mathematics — *University of South Carolina, Columbia*

Instructor of Record for nine terms:
- · Basic College Mathematics (Math 111): Fall 2012
- · Precalculus Mathematics (Math 115): Fall 2011, Fall 2013
- · Calculus for Business Administration and Social Sciences (Math 122): Fall 2014, Spring 2015
- · Calculus II (Math 142): Summer 2011
- · Finite Mathematics (Math 170): Spring 2012, Spring 2013, Spring 2014

RESEARCH EXPERIENCE

Post-Doctoral Research Associate (UTK)   June 2018 – present
Postdoctoral Researcher (UD)   January 2018 – May 2018
Supervisor: Michela Taufer   *University of Delaware, Newark; University of Tennessee, Knoxville*

- Research with the Global Computing Laboratory, supported by the following grants
- NSF #1513025, #1841552: A comprehensive methodology to pursue reproducible accuracy in ensemble scientific simulations on multi- and many-core platforms
- NSF #1724843, #1854312: Cyberinfrastructure tools for precision agriculture in the 21st century

Coleman Postdoctoral Fellow   September 2015 – December 2017
Research Mentors: Claude Tardif and David Wehlau   *Queen's University, Kingston*

- Investigated connections between homomorphisms on relational structures and logical statements, such as choice, filter, and order axioms
- Explored the chromatic number of arc graphs and connections with posets

Graduate Research Workshop in Combinatorics   August 2014; June 2015
GRWC #1;2   University of Colorado Denver & University of Denver; Iowa State University, Ames

- Collaborated with graduate students, postdoctoral fellows, and faculty at both GRWC
- Investigated problems with (di)graph orientations and labeling, matrix permanents, posets, regular graphs, triangles in graphs, and sequence folding

Research Assistant, Internal Grant   June – July 2014
Advisor: Joshua Cooper   *University of South Carolina, Columbia*

- Assistive technology project: speech to LaTeX code
- Worked with CMU Sphinx, GOLD Parser, and Java in NetBeans and Eclipse
- Gained familiarity with the grammars, dictionaries, and acoustic models used in speech processing

Graduate Research, NSF Grant #1001370   June – July 2012
Advisor: Joshua Cooper   *University of South Carolina, Columbia*

- Studied operations research from a discrete mathematics perspective
- Investigated the complexity of algorithms for multi-objective optimization
- Assisted undergraduate researchers in writing educational tutorials

NSF Research Experience for Undergraduates   July 2009
Project Managers: Paul Dostert and Jinjie Liu   *University of Arizona, Tucson*

- UA VIGRE: Arizona Summer Program in Computational Photonics
- Investigated complex linear systems arising from Edge FEM

PAPERS

Published

- D. Rorabaugh. "Graph cover-saturation." *Graphs and Combinatorics* (in press).
- A. Bernsteyn, O. Khormali, R. Martin, J. Rollin, D. Rorabaugh, S. Song, and A. Uzzell. "Regular colorings and factors in regular graphs." *Discussiones Mathematicae Graph Theory* (in press).
- B. Bjorkman, G. Cochran, W. Gao, L. Keough, R. Kirsch, M. Phillipson, D. Rorabaugh, H. Smith, and J. Wise. "k-foldability of words." *Discrete Applied Mathematics* 259:19–30 (2019).
- D. Rorabaugh, C. Tardif, D. Wehlau, and I. Zaguia. "Iterated arc graphs." *Commentationes Mathematicae Universitatis Carolinae* 59:3:277–283 (2018).
- J. Cooper and D. Rorabaugh. "Density dichotomy in random words." *Contributions to Discrete Mathematics* 13:1 (2018).
- D. Rorabaugh, C. Tardif, and D. Wehlau. "Logical compactness and constraint satisfaction problems." *Logical Methods in Computer Science*, 13:1:1:1–11 (2017).
- J. Cooper and D. Rorabaugh. "Asymptotic Density of Zimin Words." *Discrete Mathematics & Theoretical Computer Science* 18:3#3 (2016).
- D. Rorabaugh. "Toward the Combinatorial Limit Theory of Free Words." University of South Carolina, ProQuest Dissertations Publishing (2015).
- J. Cooper and D. Rorabaugh. "Bounds on Zimin Word Avoidance." *Congressus Numerantium*, 222:87–95 (2014).

Accepted (Under Revision)

- D. Chapp, D. Rorabaugh, K. Sato, D. Ahn, and M. Taufer. "A three-phase workflow for general and expressive representations of nondeterminism in HPC applications." *International Journal of High Performance Computing Applications.*
- D. Rorabaugh, M. Guevara, R. Llamas, J. Kitson, R. Vargas, and M. Taufer. "SOMOSPIE: A modular SOil MOisture SPatial Inference Engine based on data driven decisions" *eScience 2019.*

Peer-Reviewed Abstracts and Posters

- D. Chapp, D. Rorabaugh, D. Brown, E. Deelman, K. Vahi, V. Welch, and M. Taufer. "Applicability Study of the PRIMAD Model to LIGO Gravitational Wave Search Workflows." Position paper, *P-RECS'19: 2nd International Workshop on Practical Reproducible Evaluation of Computer Systems.*
- D. Chapp, D. Rorabaugh, and M. Taufer. "Modeling Record-and-Replay for Nondeterministic Applications on Exascale Systems." Position paper, *ModSim 2018.*
- R. Llamas, M. Guevara, D. Rorabaugh, M. Taufer, and R. Vargas. "Large-Scale Soil Moisture Modeling Based on Linear Geostatistics and Remotely Sensed Data." Poster, *AGU 2018 Fall Meeting.*

INVITED TALKS

- "Cyberinfrastructure for Scientific Discovery with Emphasis on Wildfire Simulations" (50 min).
  Fire Research Division seminar, NIST, Gaithersburg   20 March 2019
- "A Workflow for Soil Moisture Analytics" (20 min). *Innovative Computing Laboratory seminar*
  University of Tennessee, Knoxville   15 March 2019
- "Integer Sequences" (50 min), *Mathematics and Statistics Colloquium*
  Colby College, Waterville   11 October 2018
- "Graph domination-saturation" (50 min), *Combinatorics, Algebra, and Topology Seminar*
  United States Naval Academy, Annapolis   23 April 2018
- "Combinatorial Nullstellensatz in Graph Theory" (20 min), special session on Techniques in G.T.
  AMS Sectional Meeting, University of Buffalo, Buffalo   17 September 2017
- "Bridging Logic and Constraint Satisfaction with Relational Structures and Filters" (60 min)
  Logic, Combinatorics Seminars (combined), McGill University, Montréal   4 November 2016
- "Antimagic Graphs and Combinatorial Nullstellensatz" (60 min)
  Discrete Mathematics Seminar, University of Colorado Denver   29 September 2014
- "Collatz Generalized: An Expansion of the $3x + 1$ Problem" (30 min)
  11th Carolina Math Seminar, Benedict College, Columbia   2 February 2012

AWARDS AND HONORS

- \$44,670 of computational resources on Jetstream; two XSEDE allocations
  Co-P.I. on TRA180041 (Educational) for a graduate C.S. course   August 2018 – February 2020
  P.I., on EAR180011 (Startup) for soil moisture research   July 2018 – January 2020
- Outstanding Graduate Student Award for 2014–2015, Department of Mathematics
  University of South Carolina, Columbia   27 April 2015
- Honorable Mention, Outstanding First Year Mathematics Graduate Student
  Department of Mathematics, University of South Carolina, Columbia   19 April 2011
- Meritorious Winner, *COMAP Mathematical Contest in Modeling*   April 2010
- Roughly \$13,300 in travel support for 19 conferences and 2 collaborations (not including the following)

Fully-Funded Conferences and Workshops
- *Argonne Training Program on Extreme-Scale Computing*
  Q Center, St. Charles, Illinois   29 July – 10 August 2018
- *SP School of Advanced Science on Algorithms, Combinatorics and Optimization*
  Instituto de Matemática e Estatística, Universidade de São Paulo   18 – 29 July 2016
- *LMS-CMI Research School: Regularity and Analytic Methods in Combinatorics*
  University of Warwick, Coventry   1 – 5 July 2015
- *Rocky Mountain-Great Plains Graduate Research Workshop in Combinatorics*
  Iowa State University, Aimes   1 – 12 June 2015
- *Rocky Mountain-Great Plains Graduate Research Workshop in Combinatorics*
  University of Colorado Denver and University of Denver   27 July – 9 August 2014
- *Graph Limits, Groups and Stochastic Processes*
  Rényi Institute of Mathematics, Budapest   22 June – 2 July 2014

LANGUAGE SKILLS

Human	Intermediate-level Spanish (IRL Level 2)
	Beginner-level Portuguese (IRL Level 1)
Computer	Proficient with Python, Maple, LaTeX, Vim, R
	Teaching experience with Python in Jupyter Notebooks, Maple
	Familiar with C, MPI, Java, Visual Basic, HTML/CSS, MATLAB, Apache Spark

EXTRACURRICULAR

Society Memberships

IEEE	ΠME	CMS	AMS	SIAM
2018	2015 – 2019	2017	2010 – 2017	2014 – 2015

Math and CompSci

- Contributor, MathOverflow and StackExchange — October 2016 – present
- Editor-in-Chief, The On-Line Encyclopedia of Integer Sequences — October 2015 – present
- Contributor of 24 talks and 2 posters, various conferences and seminars
- Participant (top 0.6%), ProjectEuler.net
- Two-time Reviewer, Student Cluster Competition, SC Conference series — April 2018 – 2019
- Reviewer, IEEE Transactions on Network Science and Engineering — November 2018
- Two-time Volunteer Judge, MAA Student Poster Session, Joint Math Meetings — January 2016 – 2017
- Associate Editor, The On-Line Encyclopedia of Integer Sequences — April 2015 – October 2015
- Seven-time Math Contest Proofer, National Assessment and Testing — November 2006 – October 2013

Miscellaneous

- Board Game Event Organizer, sporadic
  Global Computing Laboratory, UD and UTK — January 2018 – present
  Dept. of Math and Stats, Queen's University — December 2015 – November 2017
- Volunteer AV Technician, once per month
  Calvary Baptist Church, Newark — March – May 2018
  St. Andrews Evangelical Church, Columbia — April 2012 – June 2015
- Volunteer Judge
  Kingston Regional Heritage Fair, Kingston — May 2017
  Frontenac, Lennox & Addington Regional Science Fair, Kingston — March 2016

At USC Columbia

- Webmaster & Secretary, Local SIAM Chapter — April 2014 – August 2015
- Organizer, Graduate Seminar in Discrete Mathematics — August 2014 – April 2015
- Member, Gamecock Math Club — August 2012 – April 2015
- Participant, Grad. Seminars in Algebra and Logic, Discrete Mathematics — August 2012 – April 2015
- Three-time Contest Grader, *11th – 13th Annual Integration Bee* — April 2013 – 2015
- Four-time Contest Proctor, *26th – 29th High School Math Contest* — January 2012 – 2015
- Four-time Exam Proctor, *AP Practice Examination* — April 2011 – 2014