

## CURRICULUM VITAE

### Cory Brunson

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#### RESEARCH APPOINTMENTS

- Assistant Professor, Laboratory for Systems Medicine, 2020–
- Postdoctoral Fellow, Skeletal, Craniofacial & Oral Biology Training Program, UConn Health, 2017–2020
- Postdoctoral Fellow, Center for Quantitative Medicine, UConn Health, 2014–2017
- Research Assistant, Virginia Bioinformatics Institute, Virginia Tech, 2010–2013
- Graduate studies and Research Assistant, Virginia Tech, 2005–2013

#### EDUCATION

- PhD, Mathematics, Virginia Tech, 2013. *Matrix Schubert varieties for the affine Grassmannian*. Advisor: Mark Shimozono.
- MS, Mathematics, Virginia Tech, 2005. *On projective planes & rational identities*. Advisor: Dan Farkas.
- BS, Mathematics; BS, Statistics; Virginia Tech, 2004.

#### JOURNAL ARTICLES

- [1] AD Guastello, **JC Brunson**, N Sambuco, LP Dale, NA Tracy, BR Allen, CA Mathews (2022) Predictors of Professional Burnout and Fulfillment in a Longitudinal Analysis on Nurses and Healthcare Workers in the COVID-19 Pandemic. Manuscript under review.
- [2] M Terasaki, **JC Brunson**, J Sardi (2020) Analysis of the three dimensional structure of the kidney glomerulus capillary network. *Sci Rep* 10, 20334.
- [3] **JC Brunson** (2020) ggalluvial: Layered grammar for alluvial plots. *J Open Source Software* 5(49), 2017.
- [4] **JC Brunson**, TP Agresta, RC Laubenbacher (2020) Sensitivity of comorbidity network analysis. *JAMIA Open* 3(1): 94–103.
- [5] **JC Brunson**, RC Laubenbacher (2018) Applications of network analysis to routinely collected healthcare data: a systematic review. *J Am Med Inform Assoc* 25(2): 210–221.
- [6] **JC Brunson**, X Wang, RC. Laubenbacher (2017) Effects of research complexity and competition on the incidence and growth of coauthorship in biomedicine. *PLOS ONE* 12(3): e0173444.
- [7] **JC Brunson** (2015) Triadic analysis of affiliation networks. *Netw Sci* 3(4): 480–508.
- [8] **JC Brunson**, S Fassino, A McInnes, M Narayan, B Richardson, C Franck, P Ion, R Laubenbacher (2014) Evolutionary events in a mathematics research collaboration network. *Scientometrics* 99: 973–998.
- [9] E Brown, **JC Brunson** (2008) Fibonacci's forgotten number. *College Math J* 39(2): 112–120.
- [10] B.A. Reid, U.C. Täuber, **JC Brunson** (2003) Reaction-controlled diffusion: Monte Carlo simulations. *Phys Rev E* 68: 1–19.

#### SOFTWARE

- [11] **JC Brunson** (2021–) individuate: 'tidymodels' Extension for Individualized Models, version 0.0.0.999. <https://github.com/corybrunson/imtidy>
- [12] M Piekenbrock, **JC Brunson**, H Hinnant (2020–) simplextree: Provides Tools for Working with General Simplicial Complexes, version 1.0.1. <https://cran.r-project.org/package=simplextree>
- [13] **JC Brunson**, B Demkowicz, S Choudhary (2020–) tdaunif: Uniform manifold samplers for topological data analysis, version 0.1.0. <https://cran.r-project.org/package=tdaunif>
- [14] **JC Brunson**, E Paul (2020–) ordr: A 'tidyverse' extension for ordinations and biplots, version 0.1. <https://github.com/corybrunson/ordr>
- [15] R Wadhwa, M Piekenbrock, **JC Brunson**, X Zhang, J Scott (2019–) ripserr: Calculate Persistent Homology with Ripser-Based Engines, version 0.2.0. <https://github.com/rrrlw/ripserr/>
- [16] **JC Brunson**, R Wadhwa, J Scott (2018–) ggtda: ggplot2-Compatible Visualization of Persistent Homology, version 0.1.0. <https://github.com/rrrlw/ggtda>
- [17] **JC Brunson**, QD Read (2015–) ggalluvial: Alluvial Plots in 'ggplot2', version 0.11.1. <https://cran.r-project.org/package=ggalluvial>

- [18] **JC Brunson** (2014) bitriad: Triadic Analysis of Affiliation Networks, version 0.3. <https://github.com/corybrunson/bitriad>

#### BOOK CHAPTERS

- [1] **C Brunson** (2015) Mythology and Moorings: Science Surveys in Cultural Context. In MO Stephenson, L Kirakosyan (Ed.) *RE: Reflections and Explorations: Essays on politics, public policy, and governance*. Virginia Tech Institute for Policy and Governance.

#### REPORTS

- [1] **JC Brunson** (2015) Analysis of increased compound drug prescriptions in Connecticut 2014–2015. Report to the Office of the State Comptroller of Connecticut.

#### FUNDING

- **Submitted.** CTSI Precision Health Initiative Pilot Grant Program, Efficient Modeling of Individualized COVID-19 Mortality Risk, 2022 Mar 11
- **Submitted.** K25 Mentored Quantitative Research Development Award (PA-20-199), Individualized computational modeling to determine outcomes after lung transplantation, 2022 Feb 12
- **Not funded** (impact score 56). K25 Mentored Quantitative Research Development Award (PA-20-199), Individualized Modeling of COVID-19 Outcomes using Electronic Health Record Data, 2021 Feb 12
- **Not funded** (impact score 42). F32 Postdoctoral Individual National Research Service Award (PA-18-670), Topological data analysis for patient stratification and outcomes research, 2018 Apr 8
- Skeletal, Craniofacial and Oral Biology Training Grant, NIDCR 5T90DE021989-07 (M Mina), Structural inference and temporal modeling of clinical co-occurrence networks, 2017 Jul 1–2020 Jul 31
- Health Center Research Advisory Council (HCRAC) Travel Award #111854, 2018 Jul 10–13
- “Developing a User-Friendly R Package Providing Standardized Coding and Analytic Methods for Comparative Effectiveness Research Using Administrative Healthcare Claims Data” (C Coleman), 2018 Feb 1–Jul 31
- Co-Principal Investigator, ACSB 2015: A Conference on Algebraic and Combinatorial Approaches in Systems Biology, NSF DMS #1503562 (MP Vera-Licona), 2015 May 22–24

#### TEACHING AND MENTORING

- Mentor (University of Florida)
  - Signaling pathway analysis via the graph modulus, 2021–: BS (1)
  - Geometric topology of glomerular capillaries, 2021–: pre-MD (1), BS (1)
  - Racial-ethnic disparities in post-transplant outcomes, 2021–: pre-MD (2)
  - Similarity-based individualized risk factor analysis, 2020–: pre-MD (1), MS (1)
  - Clinical prediction using similarity-based cohorts: A systematic review, 2020–: pre-MD (1)
- Organizer, Instructor, and Helper, The Carpentries
  - National Association of Multicultural Engineering Program Advocates (NAMEPA), 2022 Feb 17–18
  - Introduction to R, 2022 Jan 31–Feb 1
  - Introduction to R, 2021 Sep 28
- Co-supervisor, Mathematics in Medicine Training Program (UConn Health)
  - Topological Modeling of Personalized Outcome Prediction, 2019–2022: PhD (2), MD–PhD (1)
- Mentor, High School Research Apprentice Program
  - Robustness analysis of the Mapper construction, 2019 Summer: HS (2)
  - A tidyverse extension for ordination and biplot analysis, 2018 Summer: HS (1)
  - Formal concept analysis of chronic comorbidities, 2016 Summer: HS (1)
- Mentor, Research Experience for Undergraduates (REU) on Modeling and Simulation in Systems Biology
  - Modeling Incidence and Severity of Disease using Healthcare Data, 2017 Summer: Undergrad (2)
  - Network analysis of mathematics research collaborations, 2010 Summer: Undergrad (4)
- Adjunct instructor, Radford University
  - Math and Human Society, 2014 Spring
- Instructor, Virginia Tech
  - Multivariable Calculus, 2010 Spring
  - Calculus, 2008 Autumn–2009 Spring
  - Methods in Mathematical Modeling (designer and organizer), 2007 Autumn, 2008 Autumn
  - Vector Geometry (recitation), 2006 Autumn–2008 Spring

## TRAINING

- K College, University of Florida (UF) Clinical and Translational Science Institute, 2020–
- Instructor Training, The Carpentries, 2021 Jun 23–24
- Effective Business Writing Techniques, Instructional Solutions, 2021 Apr–May
- AMIA 10x10 1097: Introduction to Biomedical Informatics, 2020 Nov–2021 Mar
- Good Clinical Practices Course, National Institute of Allergies and Infectious Diseases, 2020 Nov 8
- Analysis of Big Healthcare Databases, ASA Connecticut Chapter Travel Course, 2019 Oct 16
- Responsible Conduct in Research (UConn Health MEDS 5310), 2019 Spring
- Craniofacial and Oral Biology (UConn Health MEDS 5415), 2018 Autumn
- The Science of Teaching – A Course on Effective Teaching Practice (The Jackson Laboratory for Genomic Medicine), 2018 Autumn
- Data Carpentry Workshop (The Jackson Laboratory for Genomic Medicine), 2016
- Communicating Science (GRAD 5144), 2013 Spring
- Summer School and Conference in Geometric Representation Theory and Extended Affine Lie Algebras, U Ottawa, 2009 Jun 15–Jul 3
- Workshop on Representation Theory, Geometry and Combinatorics, UC Berkeley, 2008 Jun 2–6
- Topics in Combinatorial Representation Theory, MSRI, 2008 Mar 17–21

## PROGRAMMING

- R (advanced; tidyverse); Python (intermediate); C++ (basic)
- PostgreSQL (basic); MySQL (basic)
- Macaulay 2 (intermediate); Mathematica (basic)
- Git (intermediate); GitHub, Bitbucket

## MEMBERSHIPS

- American Mathematical Society (AMS), 2019–
- American Medical Informatics Association (AMIA), 2018–
- UConn Health–JAX–GM Postdoctoral Association (UJPDA), 2015–2020
- Society for Industrial and Applied Mathematics (SIAM), 2014–

## SERVICE

- Board Member, UF Carpentries Club, 2021–2022
- Member, Faculty Council Research Task Force, 2021–
- Substitute Representative, UF Faculty Council, 2021
- Host, “New Books in Mathematics”, New Books Network, 2019– (21)
- Editing, proofreading, & formatting, *The Ethical Challenges of the Stem Cell Revolution*, 2019–2020
- Poster & digital presentation judge, Medical and Dental Student Research Day, 2017–2020 (4)
- Co-founder and President, UConn Health–JAX Genomic Medicine Postdoctoral Association, 2015–2020
- Matching Coordinator, UConn Health Speed Networking, 2019 Apr 25
- GitHub Coordinator, Medication Reconciliation Hackathon, Office of Health Strategy, 2019 Apr 6
- Organizer, Open Access and Science presentation, 2019 Jan 7
- Front Desk and Clinical Support, Hartford Gay and Lesbian Health Collective, 2015–2018
- Organizer, Scientific Writing & Editing Support Group, 2018 Autumn
- Organizer, Drop-in R Consulting, 2018
- Co-organizer, UConn Health Speed Networking, 2018 Apr 19
- Postdoc Representative and Negotiating Team Member, University Health Professionals AFT Local 3837, 2015–2017
- Drop-in editing, Tool Kit for Scientific Communication course, 2017
- Organizing Committee member, Postdoc Research Day, 2017
- Co-organizer, ACSB 2015: A Conference on Algebraic and Combinatorial Approaches in Systems Biology, 2015 May 22–24
- Co-organizer, Virginia Tech Grad Student Speed Dating, 2012–2014
- Co-organizer, Graduate Student Combinatorics Seminar, 2010–2012
- Webmaster; Treasurer, SIAM Student Chapter, 2005–2007
- Graduate Representative, Math Club, 2004–2007
- Reviewer
  - *Journal of Theoretical Biology*, 2022– (1)

- *International Journal of Health Policy and Management*, 2020– (1)
- *Journal of the American Medical Informatics Association*, 2019– (2)
- *Bulletin of Mathematical Biology*, 2019– (1)
- *Journal of Open Source Software*, 2018– (8)
- *PLoS ONE*, 2017– (1)
- AMIA Annual Symposium, 2016– (4–6/yr)

#### RESOURCES

- From work by Paul Magwene, `latex-nihbiosketch`: A  $\LaTeX$  class implementing the new NIH Biographical Sketch Format Beamer theme, 2020–2022
- `NIH-proposal-template`: A Markdown–Pandoc template for NIH grant proposals, 2018–2022
- `beamerthemeuf1`: UF  $\LaTeX$  Beamer theme, 2020–2021
- `beamerthemeuconn`: UConn  $\LaTeX$  Beamer theme, 2017–2020

#### PRESENTATIONS

- “Domain-Informed and -Agnostic Patient Similarity Measures for Individualized Mortality Prediction”, AMIA Annual Symposium, Washington DC, 2022 Nov 5–9 (submitted)
- “Toward tidy principles for matrix-decomposed data”, Joint Statistical Meetings, Washington DC, 2022 Aug 6–11 (invited)
- “Post–Lung Transplant Disparities Amongst Sarcoidosis Patients”, American Thoracic Society International Conference, 2022 May 13–18 (accepted)
- “Network Novelty in Biomedical Research: 3 Cases”, Southeast Center for Mathematics and Biology 4th Annual Symposium, remote, 2021 Dec 13–16 (poster)
- “Spatial graph analysis of glomerular capillaries”, Special Session on Algebra, Combinatorics, and Topology in Biological Structures, AMS Fall Southeastern Sectional Meeting, University of South Alabama (moved online), 2021 Nov 20–21
- “Measuring Patient Similarity and Individualizing Predictive Models”, Weekly Research Conference, Division of Pulmonary, Critical Care, and Sleep Medicine Weekly Research Conference, UF, 2021 Jan 20
- “Network Analyses of Murine Glomeruli”, Department of Mathematics Biomathematics Seminar, UF, 2020 Oct 1
- “Network analyses of murine glomeruli”, SIAM Conference on the Life Sciences, 2020 Jun 8–11 (canceled)
- “Network methods in biomedical research: 3 use cases”, Skeletal, Craniofacial, & Oral Biology Training Program Symposium, 2019 Oct 31
- “Network methods in biomedical research: 3 use cases”, Postdoc Research Day 2019, UConn Health, 2019 Sep 17
- “Network Analyses of Glomerular Capillaries”, Biology and Medicine Through Mathematics (BAMM!) Conference, Virginia Commonwealth University, 2019 May 15–17
- “Network Analyses of Murine Glomeruli”,  $\pi$  Day Research Roundtable, UConn, 2019 Mar 14
- “Interrogating network models of epidemiological comorbidity”, Skeletal, Craniofacial, & Oral Biology Training Program Symposium, 2018 Sep 25
- “Pairwise versus multivariate constructions of co-occurrence networks”, SIAM Workshop on Network Science, 2018 Jul 12–13
- “Modeling Incidence and Severity of Disease using Administrative Healthcare Data”, Open Data Salon, Hartford Public Library, 2017 Oct 26
- Tutorial on data analysis and visualization in R, Postdoctoral Seminar, UConn Health, 2015 May 26
- “Evolving Collaboration Patterns in Medical Research”, AMIA Annual Symposium, 2014 Nov 19
- “Triad census for two-mode networks”, SIAM Workshop on Network Science, 2014 Jul 7
- “Surveying the Diagnostic Landscape”, Mining Networks and Graphs: A Big Data Analytic Challenge, SIAM International Conference on Data Mining, 2014 Apr 26
- Schubert calculus (lecture series), VBI, 2012 Autumn
- “Evolution of the mathematics research collaboration network”: GSA Research Symposium, Virginia Tech, 2012 Mar 28 (poster)
- “Gröbner geometry of Schubert polynomials”: Algebraic Geometry seminar, 2011 Nov
- “An introduction to generating functions”: MSSB REU, 2010 Jul (lecture)
- “Evolution of a mathematics collaboration network”: Dynamics On Networks, SAMSI, 2011 Mar 21–23 (poster)

- “A geometric construction of  $k$ -Schur polynomials”, informal seminar, UC Davis, 2009 Jun 8
- “Equations of matrix affine Schubert varieties”: RTGC, UC Berkeley, 2008 Jun 2 (poster); GSCC, University of Kentucky, 2009 Mar 28

#### PROFESSIONAL ACTIVITIES

- Research Conference Preview Journal Club, Pulmonary Division, 2021–
- Workshop on Topological Data Analysis, Institute for Mathematical and Statistical Innovation (IMSI), 2021 Apr 26–30
- Mentoring Reimagined – International Mentoring Association 2021 Spring Symposium, 2021 Feb 23
- Faculty Boot Camp, UF Office of Faculty Affairs & Professional Development, 2020–
- Division of Pulmonary, Critical Care, and Sleep Medicine weekly seminar, UF Department of Medicine, 2020–
- BioMathematics seminar, UF Department of Mathematics, 2020–
- Topological Data Analysis discussion group, UF Department of Mathematics, 2020–
- JAMIA Journal Club, 2019–
- Education Interest Group seminar, 2019–2020
- Connecticut Institute for Clinical and Translational Science (CICATS) Study Group, 2016–2020
- Mathematics in Medicine (MiM) Journal Club, 2016–2020
- Center for Cell Analysis and Modeling (CCAM) seminar series, 2016–2020
- rstudio::conf, 2020 Jan 29–30
- American Association for the Advancement of Science Annual Meeting, 2019 Feb 14–17
- U.S. Department of Veterans Affairs Health Services Research & Development Cyberseminars, 2018 Spring
- AMIA 2014 Annual Symposium, 2014 Nov 15–19
- SIAM Workshop on Network Science, 2014 Jul 6–7
- SDM 2014 Workshop on Mining Networks and Graphs, 2014 Apr
- Applied Discrete Mathematics Group Seminar, 2011–2013
- Workshop on Algebraic Methods in Evolutionary and Systems Biology, MBI, 2012 May 7–11
- Interdisciplinary Research Day, Virginia Tech, 19 Apr 2011
- Dynamics On Networks, SAMSI, 2011 Mar 21–23
- 21st International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC), RISC, 2009 Jul 20–24
- Graduate Student Combinatorics Conference, U Kentucky, 2009 Mar 27–29
- Combinatorial, Enumerative and Toric Geometry, MSRI, 2009 Mar 23–27
- FPSAC 20, Viña del Mar, Chile, 2008 Jun 23–27