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
- `beamerthemeufl`: 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)
- "Toward a tidy package ecosystem for topological data analysis", useR!, All-virtual, 2022 Jun 20–23 (accepted)
- "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 (invited)
- "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", π 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