Anna Ritz

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Research Interests: Computational reconstruction of cellular signaling pathways; graph and hypergraph representations of biological systems; computational detection of structural variants; next- and third-generation sequence data analysis.

Table of Contents: (quick links to section)

Education

Dec 2012	**Ph.D. Computer Science**, Brown University, Providence, RI. *Algorithms for Identifying Structural Variants in Human Genomes.* [pdf] Dissertation Advisor: Benjamin Raphael.
May 2008	**Sc.M. Computer Science**, Brown University, Providence, RI. *A Minimum Description Length Approach to the Multiple Motif Problem.* [pdf] Sc.M. Advisor: Benjamin Raphael.
Jun 2006	**B.A. Computer Science**, *Magna cum laude,* Carleton College, Northfield, MN. Senior Comprehensive Project: *A Language to Construct Graphical User Interfaces.* [link]

Experience, Affiliations, and Leaves

Jul 2020–Present	**Associate Professor**, Biology Department, Reed College, Portland, OR.
Feb 2020–Present	**NSF ASCEND Faculty Fellow** (four-year participant in an NSF ADVANCE award)
Jul 2018–Aug 2022	**Visiting Scholar**, Computational Biology Program, Oregon Health & Science University (OHSU), Portland, OR.
Aug 2015–Jul 2020	**Assistant Professor**, Biology Department, Reed College, Portland, OR.
Dec 2012–Aug 2015	**Postdoctoral Research Associate**, Department of Computer Science, Virginia Tech, Blacksburg, VA. Sponsor: T. M. Murali.
Jan 2012–May 2012	**Instructor**, Department of Computer Science, Brown University, Providence, RI.
Sabbaticals & Leaves	2018/19 (sabb), 2022/23 (sabb), F2023 (part-time parental)

Publications

* *Undergraduate or post-bac co-author.* ** *High school co-author.* † *Joint first authors.* ‡ *Joint last authors.* *Gave conference talk.*

*Peer-Reviewed Journal **[J]**, Conference **[C]**, and Pedagogy **[P]** Publications*

[J1] Tunç Başar Köse*†, Jiarong Li*†, and **Anna Ritz.** Growing DAGs: Optimization Functions for Signaling Pathway Reconstruction. *Journal of Computational Biology*, in press. [bioRxiv]

[C1] Extended version of full paper from the *Seventh International Workshop on Computational Network Biology: Modeling, Analysis, and Control (CNB-MAC)* 2022. Chicago, IL. Presented by Anna Ritz.

[J2] Hannah Meier*, Isaac Schuman*, Tamara Layden, **Anna Ritz**, Colin Kremer, and Samuel Fey. Temperature mediated transgenerational plasticity influences movement behaviour in the green algae *Chlamydomonas reinhardtii*. *Functional Ecology* 2022. [publisher link]

[C2] Aysegul Bumin, **Anna Ritz**, Donna Slonim, Tamer Kaveci, and Kejun Huang. FiT: Fiber-Based Tensor Completion for Drug Repurposing. *13th ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM-BCB)* 2022. Chicago, IL. **Best Student Paper Award.** [proceedings]

[J3] Ananthan Nambiar*, Simon Liu*, Maeve Heflin*, John Malcolm Forsyth*, Sergei Maslov, Mark Hopkins, and **Anna Ritz.** Transformer Neural Networks for Protein Family and Interaction Prediction Tasks. *Journal of Computational Biology* 2022. [publisher link]

[C3] Extended version of the following short paper accepted to *ACM-BCB* '20:
Ananthan Nambiar*, Maeve Heflin*, Simon Liu*, Sergei Maslov, Mark Hopkins‡, and **Anna Ritz**‡. Transforming the Language of Life: Transformer Neural Networks for Protein Prediction Tasks. *ACM-BCB* 2020, Virtual. [proceedings] [bioRxiv]

[C4] Tobias Rubel*, Pramesh Singh, and **Anna Ritz**. Reconciling Signaling Pathway Databases with Network Topologies. *Proceedings of the Pacific Symposium on Biocomputing (PSB)* 2022. The Big Island of Hawaii, USA. [publisher link] [bioRxiv]

[P1] Elizabeth Leininger, Kelly Shaw, Niema Moshiri, Kelly Neiles, Getiria Onsongo, and **Anna Ritz**. Ten Simple Rules for Attending Your First Conference. *PLOS Computational Biology* 2021. [publisher link] [arXiv] [web portal]

[J4] Heyuan Zeng*, Jinbiao Zhang*, Gabriel A. Preising*, Tobias Rubel*, Pramesh Singh, and **Anna Ritz**. Graphery: interactive tutorials for biological network algorithms. *Nucleic Acids Research Webserver Issue* 2021 [publisher link] [arXiv] [website]

[J5] Hui-wen Lue, Daniel Derrick, Soumya Rao, Anna Van Gaest, Larry Cheng, Jennifer Podolak, Samantha Lawson, Changhui Xue, Devin Garg, Ralph White III, Christopher Ryan, Justin Drake, **Anna Ritz**, Laura M Heiser, George V Thomas. Development of combination therapies to induce durable responses in kidney cancers. *Cell Reports Medicine* 2021. [publisher link] [bioRxiv]

[J6] Amy Platenkamp, Elizabeth Detmar, Liz Sepulveda, **Anna Ritz**, Stephen L. Rogers, and Derek A. Applewhite. The *Drosophila melanogaster* Rab GAP RN-tre Regulates Non-muscle Myosin II Localization and Function through the Rho Pathway. *Molecular Biology of the Cell* 2020. [publisher link]

[C5] Tobias Rubel* and **Anna Ritz**. Augmenting Signaling Pathway Reconstructions. *ACM-BCB* 2020. Virtual. [proceedings] [bioRxiv]

[P2] Amy R. Lazarte* and **Anna Ritz**. Lowering the Barrier to Learn about Computational Research through a Course-Based Conference Experience. *Conference on Research in Equity and Sustained Participation in Engineering, Computing, & Technology (RESPECT)* 2020, Portland, OR, USA. [preprint] [pub. link]

[J7] Oscar L. Rodriguez, **Anna Ritz**, Andrew J. Sharp, and Ali Bashir. MsPAC: A Tool for Haplotype-phased Structural Variant Detection. *Bioinformatics* 2020. 36(3):922-924 [publisher link]

[J8] Zach DiNardo*†, Kiran Tomlinson*†, **Anna Ritz**, and Layla Oesper. Distance Measures for Tumor Evolutionary Trees. *Bioinformatics* 2020. 36(7):2090-2097. [publisher link] [bioRxiv]

[C6] Extended version of full paper from the *RECOMB Satellite Workshops on Computational Cancer Biology (RECOMB-CCB)* 2019, Washington D.C., USA. Presented by Zach DiNardo and Kiran Tomlinson.

[C7] Alexander King*, Ibrahim Youssef, and **Anna Ritz**. Factors Affecting Network-Based Gene Prediction Across Diverse Diseases. *10th Workshop on Integrative Data Analysis in Systems Biology (IDASB)* 2019, San Diego, CA, USA. [publisher link]

[J9] Nicholas Franzese*, Adam Groce, T. M. Murali, and **Anna Ritz**. Hypergraph-based Connectivity Measures for Signaling Pathway Topologies. *PLOS Computational Biology* 2019 Oct 25;15(10):e1007384. [pub. link]

[C8] Invited for special issue based on full paper from the *Great Lakes Bioinformatics Conference (GLBio)* 2019, Madison, WI, USA. Presented by Anna Ritz. [bioRxiv]

[J10] Ibrahim Youssef, Jeffrey Law, and **Anna Ritz**. Integrating Protein Localization with Automated Signaling Pathway Reconstruction. *BMC Bioinformatics* 2019. 20(505). [publisher link] [bioRxiv]

[C9] Extended version of full paper from the *International Conference on Bioinformatics and Biomedicine (BIBM)* 2018, Madrid, Spain. Presented by Anna Ritz. [proceedings]

[C10] Marika Swanberg*, Ira Globus-Harris*, Iris Griffith*, **Anna Ritz**, Adam Groce, and Andrew Bray. Improved Differentially Private Analysis of Variance. *19th Privacy Enhancing Technologies Symposium (PETS)* 2019, Stockholm, Sweden. [proceedings] [arXiv]

[J11] Miriam Bern*†, Alexander King*†, Derek A. Applewhite, and **Anna Ritz**. Network-Based Prediction of Polygenic Disease Genes Involved in Cell Motility. *BMC Bioinformatics* 2019, 20(12), 313. [publisher link]

[C11] Invited for special issue based on full paper from the *CNB-MAC* 2018, Washington D.C., USA. Presented by Anna Ritz.

[J12] Kimberly A. Peters, Elizabeth Detmar, Liz Sepulveda, Corrina Del Valle*, Ruth Valsquier*, **Anna Ritz**, Stephen L. Rogers, and Derek A. Applewhite. Establishment of a cell-based assay to investigate non-muscle myosin II contractility via the Folded-gastrulation signaling pathway in *Drosophila* S2R+ cells. *Journal of Visualized Experiments (JoVE)* 2018, (138), e58325. [publisher link]

[P3] **Anna Ritz**. Programming the Central Dogma: An Integrated Unit on Computer Science and Molecular Biology Concepts. *49th ACM Technical Symposium on Computer Science Education (SIGCSE)* 2018, Baltimore, MD, USA. [proceedings]

[C12] Zachary Campbell*, Andrew Bray, **Anna Ritz**, and Adam Groce. Differentially Private ANOVA Testing. *1st International Conference on Data Intelligence and Security (ICDIS)* 2018, South Padre Island, TX, USA. [proceedings] [arXiv]

[J13] Hui-wen Lue, Jennifer Podolak, Kevin Kolahi, Larry Cheng, Soumya Rao, Devin Garg, Chang-Hui Xue, Juha Rantala, Jeffrey Tyner, Kent Thornburg, Ann Martinez-Acevedo, Jen-Jane Liu, Christopher Amling, Charles Truillet, Michael Evans,Valerie O'Donnell, Daniel Nomura, Justin Drake, **Anna Ritz**, and George Thomas. Metabolic Reprogramming Ensures Cancer Cell Survival Despite Oncogenic Signaling Blockade. *Genes & Development*, 2017 Oct 15;31(20):2067-2084. [publisher link]

[J14] Aditya Bharadwaj, Divit P. Singh, **Anna Ritz**, Allison N. Tegge, Christopher L. Poirel, Pavel Kraikivski, Neil Adames, Kurt Luther, Shiv D. Kale, Jean Peccoud, John J. Tyson, and T. M. Murali. GraphSpace: Stimulating Interdisciplinary Collaborations in Network Biology. *Bioinformatics* 2017. 33(19):3134–3136. [publisher link]

[J15] **Anna Ritz**, Brendan Avent*, and T. M. Murali. Pathway Analysis with Signaling Hypergraphs. *IEEE Transactions on Computational Biology and Bioinformatics (TCBB)*, 15(5):1042–1055, 2017. [pub. link]

[C13] Extended version of full paper from the *ACM-BCB* 2014, Newport Beach, CA, USA. Presented by Anna Ritz. [proceedings]

[J16] **Anna Ritz**, Christopher L. Poirel, Allison N. Tegge, Nicholas Sharp*, Allison Powell*, Kelsey Simmons*, Shiv Kale, and T. M. Murali. Pathways on Demand: Automated Reconstruction of Human Signaling Networks. *NPJ Systems Biology and Applications*, 2:16002, 2016. [publisher link]

[J17] **Anna Ritz**, Ali Bashir, Suzanne Sindi, David Hsu, Iman Hajirasouliha, and Benjamin J. Raphael. Characterization of Structural Variants with Single Molecule and Hybrid Sequencing Approaches. *Bioinformatics* 2014. 30 (24): 3458-3466. [publisher link]

[J18] **Anna Ritz**†, Allison N. Tegge†, Hyunju Kim, Christopher L. Poirel, and T. M. Murali. Signaling Hypergraphs. *Trends in Biotechnology*, 32(7), 356-362, 2014. [publisher link]

[J19] Layla Oesper, **Anna Ritz**, Sarah J. Aerni, Ryan Drebin*, and Benjamin J. Raphael. Reconstructing Cancer Genome Organization. *BMC Bioinformatics* 2012. 13(Suppl 6):S10. [publisher link]

[C14] Proceedings of the *RECOMB Satellite Workshop on Massively Parallel Seq. (RECOMB-seq)* 2012. Presented by Layla Oesper.

[J20] Lulu Cao, Yiyuan Ding, Norris Hung, Kebing Yu, **Anna Ritz**, Benjamin J. Raphael, and Arthur R. Salomon. Quantitative Phosphoproteomics Reveals SLP-76 Dependent Regulation of PAG and Src Family Kinases in T Cells. *PLoS One* 2014. 7(10): e46725. [publisher link]

[J21] Ashley Stuckey, Andrew Fischer, Daniel H. Miller, Sara Hillenmeyer, Kyu K. Kim, **Anna Ritz**, Rakesh K Singh, Benjamin J Raphael, Laurent Brard and Alexander S. Brodsky. Integrated Genomics of Ovarian Xenograft Tumor Progression and Chemotherapy Response. *BMC Cancer* 2011. 11:308. [publisher link]

[J22] **Anna Ritz**, Pamela L. Paris, Michael M. Ittmann, Colin Collins, and Benjamin J. Raphael. Detection of Recurrent Rearrangement Breakpoints from Copy Number Data. *BMC Bioinformatics* 2011. 12:114. [pub.]

[C15] Proceedings of the *RECOMB Satellite Workshop on Comp. Cancer Biol. (RECOMB-CCB)* 2010. Presented by Anna Ritz.

[J23] Trevor O'Brien, **Anna Ritz**, Benjamin J. Raphael, and David H. Laidlaw. Gremlin: An Interactive Visualization Model for Analyzing Genomic Rearrangements. *IEEE Transactions on Visualization and Computer Graphics* 2010. 16(6):918-26. [publisher link]

[C16] Proc. of the *IEEE Information Visualization Conference (InfoViz)* 2010. Presented by Trevor O'Brien.

[J24] **Anna Ritz**†, Ali Bashir†, and Benjamin J. Raphael. Structural Variation Analysis with Strobe Reads. *Bioinformatics* 2010. 26(10): 1291-1298. [publisher link]

[C17] Proceedings of the *Conference on High Throughput Sequencing Methods and App. (HiTSeq)* 2010. Presented by Anna Ritz.

[J25] Deborah S Gross, Robert Atlas, Jeffrey Rzeszotarski, Emma Turetsky, Janara Christensen, Sami Benzaid, Jamie Olson, Thomas Smith, Leah Steinberg, Jon Sulman, **Anna Ritz**, Benjamin Anderson, Catherine Nelson, David R Musicant, Lei Chen, David C Snyder, James J Schauer. ENCHILADA: Environmental Chemistry through Intelligent Atmospheric Data Analysis. *Environmental Modelling & Software* 2010. 25(6):760-769. [publisher link]

[J26] Vinh Nguyen, Lulu Cao, Jonathan T. Lin, Norris Hung, **Anna Ritz**, Kebing Yu, Radu Jianu, Samuel P. Ulin, Benjamin J. Raphael, David H. Laidlaw, Laurent Brossay, and Arthur R. Salomon. A New Approach for Quantitative Phosphoproteomic Dissection of Signaling Pathways Applied to T Cell Receptor Activation. *Molecular and Cellular Proteomics* 2009. 8: 2418-2431. [publisher link]

[J27] **Anna Ritz**, Gregory Shakhnarovich, Arthur R. Salomon, and Benjamin J. Raphael. Discovery of Phosphorylation Motif Mixtures in Phosphoproteomics Data. *Bioinformatics* 2009. 25(1):14-21. [publisher link]

[J28] Lulu Cao, Kebing Yu, Cindy Banh, Vinh Nguyen, **Anna Ritz**, Benjamin J. Raphael, Yuko Kawakami, Toshiaki Kawakami, and Arthur R. Salomon. Quantitative Time-Resolved Phosphoproteomic Analysis of Mast Cell Signaling. *Journal of Immunology* 2007. 179: 5864-5876. [publisher link]

[C18] Benjamin J. Anderson, Deborah S. Gross, David R. Musicant, **Anna M. Ritz**, Thomas G. Smith, and Leah E. Steinberg. Adapting K-Medians to Generate Normalized Cluster Centers. *Proceedings of the Sixth SIAM International Conference on Data Mining (SDM)* 2006. pp165-175. [proceedings]

Other Publications and Reports

[O1] Darsh Mandera** and **Anna Ritz**. An Ensemble Learning Approach for Cancer Drug Prediction, 2020. [bioRxiv]

[O2] **Anna Ritz**. Algorithms for Identifying Structural Variants in Human Genomes. *Ph.D. Dissertation*, Brown University, 2012. [pdf]

[O3] **Anna Ritz**. A Minimum Description Length Approach to the Multiple Motif Problem. *Sc.M. Thesis*, Brown University, 2008. [pdf]

[O4] Benjamin J. Anderson, David R. Musicant, **Anna M. Ritz**, Andrew Ault, Deborah S. Gross, Melanie Yuen, Markus Gaelli. User-Friendly Clustering for Atmospheric Data Analysis. *Technical Report* 2005a, Carleton College, 2005. [pdf]

Honors and Awards

Nov 2020 **Lynwood W. Swanson Promise for Scientific Research Award**, The M. J. Murdock Charitable Trust. This award "is aimed at recognizing a junior faculty who has demonstrated an exceptional potential in establishing an exemplary, productive, and sustainable research program." ($10,000)

Jan 2020 **Tenure Giraffe**, sent anonymously "to people from equity seeking communities who have earned tenure in a biology discipline." (priceless)

May 2019 **Undergraduate Research Mentoring (URM) Award**, National Center for Women in Information & Technology (NCWIT). The URM Award recognizes faculty "for their outstanding mentorship, high-quality research opportunities, recruitment of women and minority students, and efforts to encourage and advance undergraduates in computing-related fields." ($5,000)

May 2013 **Symbolic Ph.D. Recipient**, Brown University. The symbolic degree recipient is nominated to represent all Ph.D. recipients in the presentation of degrees by the President of the University.

2008–2011 **NSF Graduate Research Fellowship Program (GRFP)** Fellow (see *Past External Funding*).

Funding

Current External Funding

May 2023–Apr 2026 **NSF Division of Biological Infrastructure (DBI) #2233967**
Collaborative Research: BeeHive: A Cross-Problem Benchmarking Framework for Network Biology. Principal Investigator (with PI T.M. Murali at Virginia Tech and PI Anthony Gitter at UW-Madison) ($92,513 to Reed, $1.5M total)

Aug 2022–Aug 2023 **The Alliance to Advance Liberal Arts Colleges (AALAC) Workshops**
Bioinformatics and Computational Biology in the Liberal Arts. [funded proposal]
Lead Organizer; workshop planned in late June 2023 at Reed College ($10,000)

Jun 2022–May 2023 **NSF Division of Computing and Communication Foundations (CCF) #2230929**
NSF Student Travel Grant for the 2022 International Workshop on Computational Network Biology: Modeling, Analysis, and Control (CNB-MAC). Principal Investigator ($10,000)

Jun 2018–May 2023 **NSF Division of Biological Infrastructure (DBI) #1750981**
CAREER: Network-Based Signaling Pathway Analysis: Methods and Tools for Turning Theory into Practice. Principal Investigator ($938,147)

Sep 2018–Aug 2023 **NSF Division of Computer and Network Systems (CNS) #1817245**
SaTC: CORE: Small: RUI: Differentially Private Hypothesis Testing
Co-Principal Investigator (with PI Adam Groce and Co-PI Andrew Bray) ($344,684)

Aug 2017–Jul 2023 **NSF Division of Molecular and Cellular Biosciences (MCB) #1716964**
RUI: Investigating the Molecular Mechanisms of Non-muscle Myosin II Contractility
Co-Principal Investigator (with PI Derek Applewhite) ($589,432)

Past External Funding

Sep 2018– Aug 2022 **NIH National Institute of General Medical Sciences (NIGMS) 1R15GM129857**
Mouth-brooding: a Teleost Adaptation as a Tractable Model of Metabolic Disorder
Senior Personnel (with PI Suzy Renn) NIH R15 ($419,497)

May 2016–Aug 2019 **M.J. Murdock Charitable Trust (College Research Program for Nat. Sciences)**
Developing Computational Methods to Identify Candidate Driver Genes Involved in Signaling Pathway Dysregulation in Colorectal Cancer
Principal Investigator ($41,500)

May 2016–Apr 2019 **M.J. Murdock Charitable Trust**
Investigating Cellular & Molecular Mechanisms of Neurogenesis in the Developing Zebrafish
Multi-Institutional Award to Reed College, Whitworth University, & Lewis & Clark College.
Co-Principal Investigator (with PI Kara Cerveny at Reed) ($240,000)

Sep 2017–Aug 2018 **CRA Collaborative Research Experience for Undergraduates (CREU)**
Graph-Based Semi-Supervised Learning to Predict Genes Associated with Schizophrenia
Principal Investigator ($7,500); Summer Extension Awarded ($8,000)

Sep 2016–Oct 2017 **NSF Division of Computing and Communication Foundations (CCF) #1643361**
A Course-Based Undergraduate Conference Experience in Computational Biology
Principal Investigator ($13,562)

Jun 2008–May 2011 **NSF Graduate Research Fellowship Program (GRFP)**
An Integrated View of Signaling Pathways
Mentor: Benjamin Raphael ($90,000)

Other Funding and Travel Awards

Oct 2022 NSF ASCEND Professional Development Mini-Grant Award ($500)

March 2022 Social Justice Research Internship Funding for Gender Bias in Written Evaluations ($3,000)
Reed Summer Scholarship Funds to support the Social Justice Research Internship ($1,500)

March 2021 Reed Summer Scholarship Funds for books on DEI in science and technology ($350).

Nov 2018 Reed College Stillman Drake award for travel support to BIBM 2018 ($1,200)

May 2017 Reed Faculty Development Funds to support student research in computer science ($1,500)

Mar 2017 SIGCSE 2017 Travel Grant ($500)

May 2016 Reed Faculty Development Funds for travel to visit collaborators ($1,500)

Presentations

**Undergraduate or recently-graduated co-author. **High school co-author. Presenter.*

Invited Talks

Dec 2022	Accelerating Therapeutics for Opportunities in Medicine, Oak Ridge National Lab (Virtual)
Oct 2022	Arab Academy for Science, Technology, and Maritime Transport (AASTMT) Bioinformatics and Computational Biology Workshop (Virtual)
Jul 2022	Summer Liberal Arts Institute (SLAI), Carleton College
Jun 2022	Workshop on Future Directions in Network Biology, University of Notre Dame
Jun 2022	Reunion Lecture, Reed College
Mar 2022	Department of Biomedical Informatics, University of Arkansas (Virtual)
Sep 2021	Biology Department, Reed College
Jun 2021	Oregon AI Summit (Oregon Chapter of the Girls Computing League, Virtual)
Mar 2021	Science and Mathematics, Sarah Lawrence College (Virtual)
Dec 2020	Department of Computer Science, Haverford College (Virtual)
Oct 2020	Department of Computer Science, Willamette University (Virtual) ACM Student Chapter, Lewis & Clark College (Virtual)
Oct 2019	Department of Mathematics and Statistics, Washington State University Vancouver
Sep 2019	Biology Department, Reed College
Aug 2019	Pacific Northwest Quantitative Biology (PacNoW QB) Symposium, OHSU
Feb 2019	Computer Science & Biology Departments, Rhodes College
Sep 2018	Pacific Northwest Quantitative Biology (PacNoW QB) Symposium, Lewis & Clark College
Oct 2017	Systems Science Department, Portland State University Biology Department, Lewis & Clark College
Oct 2016	Department of Mathematics and Statistics, Washington State University Vancouver
Jun 2016	Department of Computer Science, Carleton College
May 2016	Department of Computer Science, Virginia Tech
May 2015	ICTAS Center for Systems Biology of Engineered Tissues, Virginia Tech
Apr 2015	Biology Department, Reed College
Mar 2015	Society for Industrial and Applied Mathematics (SIAM) Seminar, Virginia Tech
Feb 2015	Department of Computer Science, University of Kansas
Jan 2015	BioFrontiers Institute, University of Colorado Boulder
Dec 2014	Biology Department, Reed College
Nov 2014	Department of Computer Science, University of Arizona
Oct 2014	Department of Computer Science, Virginia Tech
Oct 2013	Department of Computer Science, Carleton College
Aug 2012	Cambridge Healthtech Institute's Next-Gen Sequencing Data Analysis Conference, Providence, RI Department of Biochemistry and Molecular Genetics, University of Virginia Department of Genetics and Genomics Sciences, Icahn School of Medicine at Mount Sinai
July 2012	Department of Computer Science, Simon Fraser University Department of Computer Science, Virginia Tech

Conference and Workshop Oral Presentations
Abstract-submitted talks shown below. For conference proceeding talks, see underlined names in Publications.

Mar 2023 Pramesh Singh, Hannah Kuder, and **Anna Ritz**. Identifying Network Communities using Higher-Order Structures. *American Physical Society.*

Jul 2021 Heyuan Zeng*, Jinbiao Zhang*, Gabriel A. Preising*, Tobias Rubel*, Pramesh Singh, and **Anna Ritz**. Graphery: interactive tutorials for biological network algorithms. *ISMB.*

May 2021 Chris Magnano, Tobias Rubel*, Adam Shedivy*, Pramesh Singh, **Anna Ritz**, and Anthony Gitter. Streamlining Signaling Pathway Reconstruction. *Great Lakes Bioinformatics Conference (GLBio).*

Dec 2017 Ibrahim Youssef and **Anna Ritz**. Integrating Protein Localization Information in Signaling Pathway Reconstructions. *15th Annual Rocky Mountain Bioinformatics Conference (ROCKY).*

Nov 2014 **Anna Ritz**, Christopher L. Poirel, Allison N. Tegge, Nicholas Sharp*, Allison Powell*, Kelsey Simmons*, Shiv Kale, and T. M. Murali. Pathways on Demand: Automated Reconstruction of Human Signaling Networks. *RECOMB-RegSysGen.*

Nov 2011 **Anna Ritz**. Algorithms for Identifying Structural Variants in Human Genomes. *Grace Hopper Celebration for Women in Computing.*

Sep 2010 **Anna Ritz**, Ali Bashir, Suzanne Sindi, and Benjamin J. Raphael. Algorithms for Resequencing and Assembly using Strobe Sequencing Data. *Cold Spring Harbor Personal Genomes Meeting.*

Conference and Workshop Poster Presentations (since becoming faculty at Reed in 2015) ***[examples]***

Jul 2022 Adam Shedivy*, Nina Young*, Christopher Magnano, Pramesh Singh, Tobias Rubel, **Anna Ritz**, and Anthony Gitter. *ISMB.*

Aug 2021 Hannah S. Meier*, Tamara J. Layden, **Anna Ritz**, and Sam B. Fey. *ESA.*

Mar 2021 Tobias Rubel*, Pramesh Singh, and **Anna Ritz**. *CSHL Network Biology Meeting.*

Sep 2020 Gabriel Preising*, Joshua Faber-Hammond, Suzy Renn, and **Anna Ritz**. *ACM-BCB.*
Yuan Zhuang*, Kara Cerveny, and **Anna Ritz**. *ACM-BCB.*
Heyuan Zeng* and **Anna Ritz**. *ACM-BCB.*

Dec 2019 Darsh Mandera** and **Anna Ritz**. *ROCKY.*

Nov 2019 Tayla Isensee*, Kara Cerveny, and **Anna Ritz**. *Murdock College Science Research Conf. (MCSRC).*

Sep 2019 Amy R. Lazarte*, Samuel F. Fey, and **Anna Ritz**. *ACM-BCB.*

Aug 2019 Jiarong Li*, Tunc Basar Kose*, Ibrahim Youssef, and **Anna Ritz**. *PacNoW Quantitative Biology.*

July 2019 Ananthan Nambiar*, Mark Hopkins and **Anna Ritz**. *ISMB/ECCB.*

July 2019 Zach DiNardo*, Kiran Tomlinson*, **Anna Ritz**, and Layla Oesper. *ISMB/ECCB.*

July 2019 Nicholas Franzese*, Adam Groce, T. M. Murali, and **Anna Ritz**. *ISMB/ECCB.*

May 2019 Zach DiNardo*, Kiran Tomlinson*, **Anna Ritz**, and Layla Oesper. *RECOMB.*

Dec 2018 Amy Platenkamp, Elizabeth Detmar, Liz Selpuveda, **Anna Ritz**, Stephen L. Rogers, and Derek A. Applewhite. *ASCB/EMBO.*

Dec 2018 Madelyn O'Kelley-Bangsberg*, Tamar Conner*, David Noeckel*, Luke Steiger*, Karl Young*, **Anna Ritz**, and Derek A. Applewhite. *ASCB/EMBO.*

Nov 2018 Sol Taylor-Brill*, Kathy Thompson*, and **Anna Ritz**. *MCSRC.*

Jul 2018 Ibrahim Youssef and **Anna Ritz**. *ISMB.*

Jun 2018 **Anna Ritz**, Brendan Avent, Aditya Pratapa and T. M. Murali. *BOSC.*

Dec 2017 Ibrahim Youssef and **Anna Ritz**. *ROCKY.*

Nov 2017 Nick Egan* and **Anna Ritz**. *MCSRC.*

Aug 2017 Ibrahim Youssef and **Anna Ritz**. *ACM-BCB.*

July 2017 Nicholas Franzese*, Barney Potter*, Adam Groce, James Fix, and **Anna Ritz**. *ISMB/ECCB.*

Oct 2016 Nicole Ezell* and **Anna Ritz**. *ACM-BCB.*
Karl Menzel*, Suzy C.P. Renn, and **Anna Ritz**. *ACM-BCB.*
Barney Potter*, James Fix, and **Anna Ritz**. *ACM-BCB.* **Best Poster Award.**

Pedagogy

** Undergraduate or recently-graduated co-author. Presenter.*

Peer-reviewed pedagogy manuscripts are listed under Publications starting on page 1.

Talks and Panels

Oct 2020 **Panel Organizer and Panelist.** Haiyan Cheng, Shereen Khoja, **Anna Ritz**, and Tammy VanDeGrift. Supporting and Teaching Students at Liberal Arts Colleges in Online Courses. *Consortium for Computing Sciences in Colleges NorthWest (CCSC-NW).*

May 2019 **Invited Speaker**. Conference-based Undergraduate Experiences: Lowering the Barrier for Learning about Computational Biology. Education Track, Great Lakes Bioinformatics Conference (GLBio).

May 2019 **Panelist**, Next Steps for the Bioinformatics Education Community. GLBio.

Other Products & Activities

Participant **Cultural Competence in Computing (3C) Fellow**, Cohort 3 (2022/23). [more information]

Tutorial **Graphery: an Interactive Graph Algorithm Tutorial Website**. [website]

Assignment **Nifty Assignment: Animal Social Network Visualization**. Submitted to the Western Canadian Conference on Computing Education (WCCE); *postponed due to COVID-19.* [draft website]

Workshop **Computational Biology Workshop Module**, (Carleton College, Fall 2018) [webpage]
Finding friends in molecular interaction networks (1.5 hour undergraduate module).

Teaching

Teaching and guest lectures at Reed College unless denoted otherwise. § Virtual due to COVID-19.
Sabbaticals & Leaves: Academic Year (AY) 2019/20; AY 2022/23; Fall 2023 (part-time)

Courses

BIO131 **Introduction to Computational Biology** [course website] [final projects]
Spring 2022; Spring 2021§; Spring 2020§; Spring 2018; Spring 2017; Spring 2016; Fall 2015.

BIO211 **Introduction to Scientific Literature & Discourse**
Fall 2019.

BIO331 **Computational Systems Biology** [course website] [final projects]
Fall 2021; Fall 2020§; Fall 2019; Fall 2017; Fall 2016.

BIO431 **Computational Cancer Biology** [course website]
Spring 2022; Spring 2021§; Spring 2018; Spring 2017; Fall 2015.

BIO431 **The Genetics and Cell Biology of Cancer**
Spring 2020§.

BIO481 **Independent Study**
Spring 2017 (1 student); Spring 2016 (2 students).

CS0931 **Introduction to Computation for the Humanities and Social Sciences** [course website]
Brown University, Spring 2012.

Guest Lectures

Recurring	**Topics in Biology** (Spring 2022; Spring 2021[§]; Spring 2019; Spring 2018; Spring 2017) Computational challenges of *de novo* assembly. Class size is typically 170–200 students.
Recurring	**Cellular Biology** (BIO372 – Fall 2020[§]; Fall 2019; Spring 2019; Spring 2018) Semi-supervised learning for protein function prediction. Co-taught three combined labs in Fall 2020.
Fall 2021[§]	**Computational Biology** (CS362, Carleton College) Topics in computational systems biology.
Fall 2020[§]	**Computer Science Fundamentals I** (CSCI121) Topics in biological sequence analysis.
Spring 2020[§]	**Algorithms** (CS252, Carleton College) Network-based approaches for COVID-19 drug target prediction.
Spring 2016	**Statistical Learning** (MATH243). Geometric analysis of structural variants.
Spring 2014	**Hypergraph Algorithms and Applications** (CS6824, Virginia Tech) Signaling hypergraph theory (two lectures). **Data and Algorithm Analysis** (CS4014, Virginia Tech) Greedy algorithms (three lectures).
Fall 2013	**Computational Thinking** (CS6604, Virginia Tech) Reflections on teaching computational courses to non-computational students.
Fall 2011	**Introduction to Computation for the Humanities and Social Sciences** (CS0931, Brown University) Introduction to Python programming.
Fall 2011	**Topics in Computational Biology** (CSCI2950-C, Brown University) Structural variant detection.

Undergraduate Thesis Students

2022 SpFa	**Frank Zhuang** (with Kara Cerveny in Biology). *A RARE Catch: The Potential of Computational Algorithms in Aiding Discovery of Novel Genetic Regulation Interactions.* → Research Assistant, Biocytogen Boston Corp.
2021-2022	**Ananke Krishnan** (with Julia Michaels in Biology). *Impacts of Backyard Habitat Creation for Birds at Single-Yard and City-Wide Scales.* → Smithsonian Migratory Bird Center internship → Research Assistant, University of Maryland. **Ingrid Zoll** (with Aaron Ramirez in Biology). *Tree Health from Space: Modeling Urban Tree Health using Multispectral Satellite Imagery in Portland, OR.*
2020-2021	**Delaney Brubaker** (with Julia Michaels in Biology). *Can we build a framework for the future of sustainable agriculture knowledge?* **Tayla Isensee** (with Erik Zornik in Biology). *Sex-biased conserved gene calling expansion with orthogroups.* **Jiarong Li** (with Jim Fix in CS). *Complex network comparison using graphlets.* → Software Engineer at Microsoft. **Hannah Meier** (with Sam Fey in Biology). *Phytoplankton on the Go! Understanding the effect of thermal acclimation on the movement strategies of the green algae Chlamydomonas reinhardtii.* **Aryeh Stahl** (with David Ramirez in CS). *A generalized approach to graph de-anonymization.* → Founder of Red Panda Tutoring.
2019-2020	**Gabe Preising** (with Suzy Renn in Biology). *A computational network approach to examine biological crosstalk during mouthbrooding in the cichlid Astatotilapia burtoni.* → NIH NIGMS Diversity Supplements Program (DSP) postbac→ Biology PhD student at Stanford.

Sol Taylor-Brill (with Jay Mellies in Biology). *Computationally analyzing the effect of cannabidiol on Enterohemorrhagic E. coli using transcriptomic data.* → employee at Suvoda → lab tech at OHSU

Madeline Doak (with Erik Zornik in Biology). *Sex-biased gene expression in the brain conserved among taxa.* → employee at Suvoda.

2018–2019 **Alexander King**. *Multi-omic analysis of genetically induced conditions.* → Neuroscience PhD student at UC Riverside.

Miriam Bern (with Jeremy Coate in Biology). *A comparison of two methods for identifying alternative splicing in diploid and tetraploid Arabidopsis thaliana strains.* → Associate Computational Biologist at the Broad Institute.

Amy Rose Lazarte (with Sam Fey in Biology). *Just keep swimming: resolving the patterns and dynamics of body temperature in freshwater phytoplankton.* → Software engineer at Puppet.

Ananthan Nambiar (with Mark Hopkins in CS). *Computing the language of life.* → Bioengineering PhD student at UIUC.

2017–2018 **Petra Wijngaard** (with Derek Applewhite in Biology). *How Cytoscouts got Shot out of Dr. Ritz's new interactome.*

2016–2017 **Moira Differding** *Your microbes are super models: using microbiome data to reproducibly predict Crohn's Disease.* → MPH at Johns Hopkins → Epidemiology PhD Student at Johns Hopkins School of Public Health.

Olive Franzese (with Adam Groce in CS). *Examining the practicality of shortest hyperpaths for signaling pathway analysis: the Cheating Hyperpath Algorithm as an alternative approach.* → CS PhD student at UMD College Park → NSF GRFP Fellow → CS PhD student at Northwestern.

2015–2016 **Olivier Ezell**. *Pathway models of signal dysregulation in schizophrenia.* → Intern at White Bird Clinic → Medical school student at OHSU.

Cameron Shard Milne (with Sarah Schaack in Biology). *Identification of transposable element subfamilies using a phylogenetic network approach.* → Lab technician at UCSC → Environmental Studies Master's student at UW.

Barney Potter (with Jim Fix in CS). *Prize-collecting Steiner trees in directed signaling hypergraphs.* → Research Assistant at Fred Hutch → CS PhD Student at KU Leuven (Belgium).

Mentoring

Mentoring at Reed College unless denoted otherwise. ‡*Co-advised students.*

Postdocs, Postbacs, Visiting Scholars, and Other Mentored Students

Postdocs **Pramesh Singh** (Aug 2020–Present)

Ibrahim Youssef (Jan 2017–Dec 2019) → Assistant Professor of Systems and Biomedical Engineering at Cairo University, Cairo, Egypt.

Postbacs **Alex Richter '22** (Summer 2022)

Tobias Rubel '19 (Jan 2020–Aug 2021) → CS PhD Student at UMD College Park

Amy Rose Lazarte‡ **'19** (Summer 2019) → Software engineer at Puppet.

Alexander King '19 (Summer 2019) → Neuroscience PhD student at UC Riverside.

Olive Franzese '17 (Sep 2017–May 2018) → CS PhD student at UMD College Park → NSF GRFP Fellow → CS PhD student at Northwestern.

Scholars **Ramin Neshati** (2016–2017). Visiting scholar through the Encore Fellows Program.

High School **Darsh Mandera** (Sep 2017–Present). High school student in the Portland area.

@VT **Divit Singh**‡ (2014–2015). Master's student at Virginia Tech → Software engineer at Xbox.

Craig Estep‡ (2013–2014). Master's student at Virginia Tech.

Amy Olex‡ (2013–2014). PhD student at Virginia Tech → Bioinformatics specialist at VCU.

Undergraduate Computational Biology Researchers

Summer 2022 **Max Bennett**‡ (Neuroscience major)
Hannah Kuder (Physics major)
Henry Jacques‡ (Biochemistry and Molecular Biology major)
Lixing (Li) Yi (Math/CS major)
Nina Young (CS-Art interdisciplinary major)
Heyuan (Larry) Zeng (Math/CS major)

Summer 2020 **Alex Richter** (Math/CS major)
Aryeh Stahl (Math/CS major) → Founder of Red Panda Tutoring.
Heyuan (Larry) Zeng (Math/CS major)
Yuan (Frank) Zhuang (Biology major) → Research Assistant, Biocytogen Boston Corp.

Summer 2019 **Karl Young**‡ (Biology major) → Bioinformatician at the Vollum Institute at OHSU.
Jiarong Li (Math/CS major) → Software Engineer at Microsoft.
Tayla Isensee‡ (Biology major)
Tunc Kose (Biology/CS interdisciplinary major) → CS Master's student at Aalto University.

Summer 2018 **Alexander King**‡(Neuroscience major) → Neuroscience PhD student at UC Riverside.
Miriam Bern‡ (Biology major) → Associate Computational Biologist at the Broad Institute.
Sol Taylor Brill (Biology major) → employee at Suvoda → lab tech at OHSU.
Kathy Thompson (CS major)
Usman Hafeez (Math major)

Summer 2017 **N. Sheng-Ming Egan** (Sociology major)
Yurel Watson (CS major)
Giorlando Ramirez (Economics major) → Watson Fellow.

Summer 2016 **Karl Menzel**‡ (Biology major)

2014–2015 **Nicholas Sharp**‡ (CS major at Virginia Tech) → CS PhD student at CMU.
Brendan Avent‡ (CS major at Virginia Tech) → CS PhD student at USC.

Undergraduate Differential Privacy Researchers (co-advised with Adam Groce & Andrew Bray)

Summer 2019 **Wenxin Du**‡, **Kaiyan Shi**‡, **Canyon Foot**‡, **Zeki Kazan**‡, and **Monica Moniot**‡.

Summer 2018 **Simon Couch**‡ → Goldwater Fellow, **Marika Swanberg**‡→ CS PhD student at BU, **Iris Griffith**‡, **Kaiyan Shi**‡, **Ira Globus-Harris**‡→ Software engineer at BU, and **Zeki Kazan**‡.

Summer 2017 **Zachary Campbell**‡→ Software engineer at OppLoans.

Other Research Positions

Summer 2020 **Jiarong Li**‡, Cloud Computing Research Assistant. Supported by Instructional Technology Services (ITS) and jointly mentored with ITS Director Trina Marmarelli. → Software Engineer at Microsoft.

Service

§ *skipped one or two years due to COVID.*

Professional Organizations

2014–Present **SIGBio:** ACM Special Interest Group in Bioinformatics, Comp. Biology and Biomed. Informatics

2012–Present **SIGCSE:** ACM Special Interest Group in Computer Science Education

2011–Present **ACM:** Association for Computing Machinery

2010–Present **ISCB:** International Society of Computational Biology

Professional Service

2022–Present	**Workshop Organizer**, CNB-MAC. [website]
2017–Present	**Co-organizer**§, Pacific Northwest Quantitative Biology Meeting (PacNowQB) [website]
2020–2022	**Proceedings Chair**, ACM-BCB
2019–2022	**Organizer**§, Undergraduate Travel Award, *ACM-BCB*. [website]
2017–2021	**Co-chair**, NSF Graduate Travel Awards, ACM-BCB
2020	**Panelist**, *The Future of Bioinformatics,* Computational Structural Biology Workshop (CSBW). **Co-Chair**, Student Mentoring Session, ACM-BCB 2020.
2019	**Panelist**, Women & Minorities in Bioinformatics Panel, ACM-BCB 2019 **Poster Prize Committee**, Conference on Intelligent Systems for Molecular Biology and the European Conference on Computational Biology (ISMB/ECCB)
2018	**Scientific Program Committee**, Galaxy Community Conference (GCC)
Journal Reviewer:	Bioinformatics BioMed Central (BMC) Bioinformatics Frontiers in Genetics IEEE Transactions on Molecular, Biological, and Multi-Scale Communications (TMBMC) IEEE Transactions on Computational Biology and Bioinformatics (TCBB) Journal of Computational Biology (JCB) Nature Publishing Group (NPG) Cell Death & Disease (CDDIS) PLOS Computational Biology PLOS One
Conf. Reviewer:	RECOMB, ISMB, RECOMB RSG, PSB, ACM-BCB, CNB-MAC
NSF Reviewer:	Division of Biological Infrastructure (BIO-DBI) Division of Information and Intelligent Systems (CISE-III) Division of Undergraduate Education (EHR-DUE) Division of Human Resource Development (EHR-HRD) NSF's Big Ideas (NSF-wide)

Service with Historically Marginalized Groups in STEM

2017–2022	**Regional Selection Committee**§, NCWIT Aspirations in Computing Award
2021	**Panelist**, Applying to a PUI in Chemistry (organized by Kelly Chacón) **Invited Speaker** at the Oregon AI Summit (Oregon Chapter of the Girls Computing League)
2017–2021	**Reviewer**, NCWIT Aspirations in Computing Award for high school girls. **Reviewer**, NCWIT Collegiate Award for college women.
2015–2020	**Reviewer**, Grace Hopper Celebration for Women in Computing Scholarships.
2018	**Panelist**, Girls Inc. Eureka program visit to Reed, for high school girls interested in STEM.
2016–2018	**Poster Committee**, Grace Hopper Celebration for Women in Computing.
2015	**Session leader**, Women in Computing Day, Virginia Tech.
2013–2014	**Interim Faculty Advisor**, Association for Women in Computing (AWC), Virginia Tech.
2009–2011	**Coordinator**, Family Days Camp, International Institute of Rhode Island. Summer day camp for refugee children and their families in the Providence area.
2008–2009	**Guest Speaker**, Artemis Program, Brown University. Day camp for entering ninth grade girls organized by Brown undergraduates. I gave talks on pattern finding and computational biology.

Service within Reed College

Fall 2022	**Group Mentor** for 15 Visiting Professors in Math, Natural Sciences, and Psychology

Oct 2022	**Panelist**, *Job Market Seminar for Visiting Faculty*, Associate Dean's Office
2021/22	**Division Secretary**, Division of Mathematical and Natural Sciences
Mar 2021	**Panelist**, *Integrating Data & CS Across the Curriculum*, Development Office
Mar 2020, 2021	**Panelist**, Virtual accepted student open house for biology, Admissions
Mar 2020, 2021	**Panelist**, Virtual accepted student open house for computer science, Admissions
Jan 2021	**Workshop co-leader**, *Rigor and Compassion in the COVID Classroom*, CTL
Sep 2020	**Panelist**, NSF GRFP Workshop, organized by Suzy Renn in the Biology Department
Mar 2020	**Workshop co-leader**, *Online Teaching in Math and the Natural Sciences*, CTL
Sep 2019	**Workshop co-leader**, *Teaching students with a wide range of preparation in STEM*, CTL
Aug 2019	**Panelist**, Parent orientation curriculum panel, Student Orientation
May 2016, 2017, 2018	**Panelist**, Liberal Arts Diversity Officer (LADO) Workshops at Stanford & UC-Davis
May 2018	**Panelist**, Advising workshop for first-time faculty advisers
Mar 2016	**Panelist**, Open Access Panel as part of Reed's Digital Scholarship Week
Committees	Committee on Advancement and Tenure (1 year) Committee on Diversity (2 years) Computing Policy Committee (2 years) Alcohol and Other Drugs (AOD) Committee & AOD Review Panel (1 year) Bookstore Board (1 year) Ad-Hoc Committee on Student Success (1 year)
Search Committees	Chief Information Officer, CS TT (multiple), Physics TT, Math TT, CS Visiting (multiple), Math Visiting (multiple), Statistics Visiting, Media Studies Visiting