

David M. Ruth

Director, Center of Inquiry for Science, Technology, Engineering, and Mathematics at UATX
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EDUCATION

Ph.D. Operations Research, Naval Postgraduate School, Monterey, 2009. Dissertation title:
Applications of Assignment Algorithms to Nonparametric Tests for Homogeneity.
Dissertation advisor: Professor Robert Koyak.

M.A. National Security and Strategic Studies, Naval War College, Newport, 2006. Graduated
with distinction.

M.S. Meteorology and Physical Oceanography, Naval Postgraduate School, Monterey, 2001.
Graduated with distinction.

M.A. Mathematics, University of Texas, Austin, 1993.

B.S. Mathematics, United States Naval Academy (USNA), 1991. Graduated with honors and
with distinction.

WORK EXPERIENCE

Director, Center for STEM at UATX, August 2022-present.

Permanent Military Professor (PMP), United States Navy, 2006-2022.

- Associate Professor of Mathematics, USNA, August 2015-July 2022.
- Associate Chair, USNA Mathematics Department, 2013-2015.
- Assistant Professor of Mathematics, USNA, November 2009-2015.

Meteorology and Oceanography Officer, United States Navy, 1999-2006.

- Long Range Plans Officer, Commander Naval Forces Korea, 2003-2005.
- Ship's Oceanographer, USS CONSTELLATION (CV 64), 2001-2003.
- Adjunct Professor of Mathematics, Embry Riddle Aeronautical University, 2002-2003
(concurrent with service aboard USS CONSTELLATION).

Submarine Officer, United States Navy, 1991-1999.

- Instructor of Submarine Navigation and Communications, Submarine Officer School,
1997-1999.
- Division Officer, USS ANNAPOLIS (SSN 760), 1994-1997.
- Student, Submarine Officer Training, 1993-1994.

PUBLICATIONS (PEER-REVIEWED)

- D. Ruth, N. Wood, and D. VanDerwerken, "Fully nonparametric survival analysis in the presence of time-dependent covariates and dependent censoring," *Journal of Applied Statistics*, Feb, 2022.
- D. Ruth. "Probability Theory," in *Mathematics in Cyber Research*, eds. P. Goethals, N. Scala, and D. Bennett, Chapman and Hall/CRC, Feb, 2022.
- P. Fahey, D. Ruth, D. Clarkson, E. Fox, M. Gobet, M. Garaga, S. Greenbaum, H. De Long, P. Trulove, and D. Durkin, "Evaluating the Ion Transport of 1-Ethyl-3-Methylimidazolium Acetate Solutions Containing Carbohydrate Solutes," *Journal of The Electrochemical Society*, Oct 2019.
- D. Phillips, A. McGlaughlin, D. Ruth, L. Jager, A. Soldan, "Graph Theoretic Analysis of Structural Connectivity Across the Spectrum of Alzheimer's Disease: The Importance of Graph Creation Methods." *NeuroImage: Clinical*, Jan 2015, 7: 377–390.
- D. Ruth, "A New Multivariate Two-Sample Test Using Regular Minimum-Weight Spanning Subgraphs," *Journal of Statistical Distributions and Applications*, Nov 2014, 1(22): 1–12.
- K. Caudle and D. Ruth, "A Computational Approach to Investigate the Properties of an Estimator," *Journal of Computers in Mathematics and Science Teaching*, May 2013, 32(4): 381-393.
- M. Kidwell, M. Meyerson, D. Ruth, and M. Wakefield, Problem Solution 11607, *The American Mathematical Monthly*, Jun-Jul 2013, 120: 572-573.
- D. Ruth, T. Mastre, and R. Fricker, "A Study of Mobile Learning Trends at the US Naval Academy and the Naval Postgraduate School," *EDUCAUSE Review Online*, Jan 2013.
- D. Ruth and R. Koyak, "Nonparametric Tests for Homogeneity Based on Non-Bipartite Matching," *Journal of the American Statistical Association*, Dec 2011, 106(496): 1615-1625.
- K. Caudle, G. Fowler, L. Jager, and D. Ruth, "Discounting Older Data," *Wiley Interdisciplinary Reviews: Computational Statistics*, Jan/Feb 2011, 3(1): 30-33.

PUBLICATIONS (OTHER)

- D. Ruth, S. Buttrey, and L. Whitaker, "An approach to the multivariate two-sample problem using classification and regression trees and minimum-weight spanning subgraphs," *Proceedings of the 2016 Joint Statistical Meetings*, Aug 2016.
- D. Ruth and S. Buttrey, "AcrossTic: A Cost-Minimal Regular Spanning Subgraph with TreeClust," R package version 1.0-3, Aug 2016.
- D. Ruth and R. Koyak, "Applications of Assignment Algorithms to Nonparametric Tests for Homogeneity," *Proceedings of the 2010 Joint Statistical Meetings*, Aug 2010.

- D. Ruth, "Beyond Goldwater-Nichols: Impact to the Combatant Commander," Defense Technical Information Center, <https://doi.org/10.21236/ada463955>), Feb 2006.
- D. Ruth and J. Gilbert, "The Mellin Transform in Signal Analysis," Technical Report #ARL-TR-94-4, Applied Research Laboratories – University of Texas at Austin, 11 Mar 1994.

PRESENTATIONS

- 22 July 2021, National Security Agency SPORT graduate student intern visit to USNA, Annapolis, MD. *Resampling Techniques, with Defense Applications*.
- 19 July 2021, Cambridge Digital Bible Research Seminar, (virtual). *Data Visualization*. Invited speaker.
- 08 January 2021, Joint Mathematics Meetings, (virtual). *Graph-Theoretic Approaches to Detecting Change in Multivariate Data Streams*. AMS Special Session on Mathematics in Security & Defense. Invited speaker.
- 29 July 2019, National Security Agency SPORT (Summer Program for Operations research and Technology) graduate student intern visit to USNA, Annapolis, MD. *Graph-Theoretic Two-Sample Statistical Tests*. 90-minute tutorial.
- 23 April 2019, Combinatorics Seminar, National Security Agency. *Graph-Theoretic Two-Sample Statistical Tests: Something Old, Something New*. Guest lecturer.
- 10 April 2019, DATAWorks 2019, Springfield, VA. *Communicating Statistical Concepts and Results: Lessons Learned*. Invited panelist.
- 19 January 2019, Joint Mathematics Meetings, Baltimore, MD Canada. *A Nonparametric Multivariate Two-Sample Test Using Cumulative Counts of Ranked Edges*. Invited speaker.
- 29 July 2018, Joint Statistical Meetings, Vancouver, Canada. *Statistics Education for Future Military Leaders: United States Naval Academy*. Invited panelist.
- 23 July 2018, National Security Agency SPORT graduate student intern visit to USNA, Annapolis, MD. *Graph-Theoretic Two-Sample Statistical Tests*. 90-minute tutorial.
- 08 May 2018, Combinatorics Seminar, National Security Agency. *Graph-Theoretic Two-Sample Statistical Tests: Something Old, Something New*. Guest lecturer.
- 16 November 2017, Basic Notions, USNA, Annapolis, MD. *Resampling methods*.
- 16 September 2017, Virginia Sports Analytics Meeting, Roanoke College, Salem, VA. *A Modular Markov-like Model for Baseball*.
- 01 August 2017, Joint Statistical Meetings, Baltimore, MD. *A Cumulative Edge-Counting Approach to the Multivariate Two-Sample Problem*.
- 07 July 2017, National Security Agency SPORT graduate student intern visit to USNA, Annapolis, MD. *Non-parametric statistical methods*. 90-minute tutorial.

- 04 April 2017, Science of Test Workshop, Springfield, VA. *Resampling methods*. 90-minute tutorial.
- 27 October 2016, Conference on Applied Statistics in Defense, Washington, D.C. *Resampling methods*. 90-minute tutorial.
- 15 October 2016, International Conference on Statistical Distributions and Applications, Niagara Falls, Canada. *An approach to the multivariate two-sample problem using classification and regression trees and minimum-weight spanning subgraphs*.
- 02 August 2016, Joint Statistical Meetings, Chicago, IL. *An approach to the multivariate two-sample problem using classification and regression trees and minimum-weight spanning subgraphs*.
- 10 August 2015, Joint Statistical Meetings, Seattle, WA. *Graph Theoretic Analysis of Structural Connectivity Across the Spectrum of Alzheimer's Disease: The Importance of Graph Creation Methods*.
- 25 July 2016, National Security Agency SPORT graduate student intern visit to USNA, Annapolis, MD. *Non-parametric statistical methods*. 90-minute tutorial.
- 03 August 2014, Joint Statistical Meetings, Boston, MA. *A Multivariate Two-Sample Test Using Regular Minimum-Weight Spanning Subgraphs*.
- 01 August 2014, Institute of Mathematical Statistics New Researchers Conference in Statistics and Probability, Harvard University, Boston, MA. *A Multivariate Two-Sample Test Using Regular Minimum-Weight Spanning Subgraphs*.
- 12 October 2013, International Conference on Statistical Distributions and Applications, Central Michigan University, Mount Pleasant, MI (with travel grant award). *A Multivariate Two-Sample Test Using Regular Minimum-Weight Spanning Subgraphs*.
- 30 August 2011, Distance Learning Coordination Committee Meeting, NPS, Monterey, CA. *Mobile Learning Survey at the United States Naval Academy*.
- 11 March 2011, Department of Applied Mathematics and Statistics Seminar Series, Johns Hopkins University. *Applications of Assignment Algorithms to Nonparametric Tests for Homogeneity*.
- 25 October 2010, Basic Notions, USNA, Annapolis, MD. *What is an estimator?*
- 09 December 2009, Department Mathematics Colloquium Series, USNA. *Applications of Assignment Algorithms to Nonparametric Tests for Homogeneity*.

STUDENT RESEARCH

- “Improved Dissimilarity Measures for Statistical Learning,” by Midshipman 1/C Marshall Shires, 2019-2020 Bowman Scholar project.
- “Innovations to Increase the Power of State-of-the-Art Graph-Theoretic Two-Sample Statistical Tests,” Midshipman 1/C Michael Wallace, 2017-2018 Trident Scholar project.

“Applications of Graph-theoretic Tests to Change Detection,” Midshipman 1/C Colin Bogdan, 2013-2014 Trident Scholar project.

“Optimal Submarine Deployment Scheduling,” Midshipman 1/C Darren Pastrana, 2012 Bowman Scholar project.

“An Exploration of Two Nonparametric Statistical Tests,” by Midshipman 1/C Tyler Arp, 2011 Mathematics Honors project.

OTHER SCHOLARLY SERVICE

2020: Peer reviewer for book chapter “Data Analysis” in *Mathematics in Cyber Research*, eds. P. Goethals, N. Scala, and D. Bennett, Chapman and Hall/CRC, Feb, 2022.

2016-2017: Journal referee for *Military Operations Research*.

2015: Distinguished Visiting Professor for the Summer Program for Operations Research Technology (SPORT) at the National Security Agency. Mentored 10 PhD students in the fields of Mathematics, Statistics, and Operations Research in support their work on real-world agency projects for 12 weeks.

2014-2015: Journal referee for *Naval Research Logistics*.

ACADEMIC AWARDS AND RECOGNITION

Recipient of US Naval Academy Military Professor Teaching Excellence Award, 2020.

This award is bestowed biennially in even-numbered academic years upon a military faculty member at the Naval Academy whose contributions to the academic, professional, and moral development of midshipmen reflect the highest principles of excellence in education.

US Naval Academy Military Professor Teaching Excellence Award Finalist, 2018.

Faculty Fellowship Program in Israel Fellow, May-June 2016.

Letter of Commendation from National Security Agency for service as Distinguished Visiting Professor to the Summer Program for Operations Research Technology, May-August 2015.

US Naval Academy Military Professor Teaching Excellence Award Finalist, 2014.

US Naval Academy Class of 1951 Military Faculty Teaching Excellence Award Finalist, 2011.

Oceanographer of the Navy Award for Outstanding Academic Performance in Meteorology and Oceanography, 2001.

Certified Master Training Specialist, Naval Education and Training Command, 1998.

US Naval Academy Professor Henry M. Robert, Jr., Prize for Excellence in Mathematics, 1991.