Chancellor "Chance" Johnstone

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Education

Iowa State University
Ph.D in Statistics — *Aug 2017 – Nov 2020*

Air Force Institute of Technology
M.S. in Operations Research — *Oct 2013 – Apr 2015*

United States Air Force Academy
B.S. in Operations Research, Distinguished Graduate — *Jun 2009 – May 2013*

Professional Experience

GE Aerospace — **Cincinnati, OH**
Senior Staff Data Scientist — *June 2025 – Present*

- Currently supports commercial engines and services data science team with classical statistics, machine learning and large language model expertise.
- Provides technical leadership for junior data scientists and statistical consulting across all business efforts.

Pacific Northwest National Laboratory — **Dayton, OH (Remote)**
Visiting Researcher (Intern) (Environmental Subsurface Science Group) — *Mar 2025 – Present*

- Delivering classical statistics/ML/deep learning approaches for aquifer property modeling to support environmental remediation of nuclear contamination; part of the DoD SkillBridge program for transitioning service-members.

Air Force Institute of Technology — **Dayton, OH**
Assistant Professor of Statistics (Department of Mathematics and Statistics) — *Nov 2020 – Mar 2025*

- Teaching and Collaboration
  - Delivered graduate-level statistics and ML courses to include topics like introductory statistics, experimental design, federated learning, computational statistics (with Python), multimodal data analysis and reliability.
  - Managed research program with over 20 graduate student researchers at Master's and PhD level; executed $330K research budget to support novel methodological and theoretical research.
  - Led cross-functional research multimodal data group w/ 25+ researchers; research applications included physiological data analysis for special forces members, anomaly detection, concussion prevention and mitigation, healthcare outcome prediction, tornado and lightning event prediction, and radiography.
- Research Efforts
  - Utilized physiological data (e.g., sleep hypnograms, HRV) collected from Oura devices for privacy-preserving ML; analyzed multiple cohorts of data to generate daily mental and physical-readiness predictions of service-members.
  - Developed methodology for privacy-preserving scoring systems w/ federated sparse logistic regression (FedMSS). Applied FedMSS to heart disease prediction to create interpretable methods of medical provider decision support.
  - Introduced novel prediction set methods for multi-output regression. Applied to robust optimization frameworks to provide data-driven methods for optimization under uncertainty (e.g., with minimum cost flow problems).

Combined Joint Task Force Operation Inherent Resolve — **Camp Arifjan, Kuwait**
Lead Analyst (Strategy) — *Jan – July 2024*

- Managed team (25+) of data representatives across nine organizations; informed U.S. foreign policy through recurring analytical updates to decision-makers; provided quick-turn responses to congressional information requests.
- Executed key analysis to support task prioritization of counter-ISIS mission; informed decisions for $400M budget.

Iowa State University — **Ames, IA**
Doctoral Researcher — *Aug 2017 – Aug 2020*

- Performed novel methodological/theoretical machine learning research for nonparametric/distribution-free methods.
- Delivered novel research with tree-based predictors; authored open-source software (`piRF`) for generating prediction sets for tree-based prediction methods; introduced isotonic regression forests for implementing shape constraints.

U.S. Air Forces Central — **Al Udeid AB, Qatar**
Data Scientist — *June 2016 – Jan 2017*

- Performed data fusion across multiple data sources; automated daily and monthly progress reports; generated 200+ data-informed responses to external requests; drove shifts in strategic planning for U.S. military operations.
- Executed exploratory data analysis to discover aircraft loss patterns; recouped $2.4M yearly with loss reduction.

U.S. Air Forces in Europe - Air Forces Africa **Ramstein AB, Germany**
Research Scientist *Apr 2015 – Aug 2017*

- Delivered predictive maintenance dashboard; 53% scheduling accuracy increase translating to $2.1M saved yearly.
- Optimized robust basing scenarios in Africa considering military/political imperatives; supplemented $2M RAND study; received *Air Force Outstanding Junior Analyst of the Year (2015)* for outstanding analytical contributions.

National Reconnaissance Office **Chantilly, VA**
Data Science Intern (Enterprise Analysis Division) *Jun – Jul 2012*

- Developed mixed-integer programming models to optimize scheduling and assignment of surveillance assets.

Achievements and Awards

United States Air Force Outstanding Junior Analyst of the Year (2015)

CogPilot Datathon 2022. 1st Place (classification). Group received "Most Innovative", "Most Interpretable" awards.

Skill and Tools

Programming: R (caret, ranger), Python (pytorch, sklearn, pandas), MySQL, Julia, Git, C++, GAMS

Analytical Methods: nonparametric statistics, statistical testing, uncertainty quantification, constrained optimization, federated learning, experimental design, computer vision, multivariate regression, responsible AI, semi-supervised learning, robust machine learning, Bayesian statistics, dimensionality reduction, reliability.

Teaching

Winter 2025: DASC 512 Introduction to Probability and Statistics with Python; 4 credit hours, 27 enrolled,
Winter 2025: STAT 587 Applied Probability and Statistical Analysis; 4 credit hours, 7 enrolled,
Fall 2025: STAT 587 Applied Probability and Statistical Analysis; 4 credit hours, 27 enrolled,
Fall 2024: STAT 587 Applied Probability and Statistical Analysis; 4 credit hours, 23 enrolled,
Fall 2023: STAT 521 Applied Statistical Data Analysis; 5 credit hours, 15 enrolled
Fall 2023: STAT 587 Applied Probability and Statistical Analysis; 4 credit hours, 28 enrolled,
Summer 2023: STAT 694 Design of Experiments; 4 credit hours, 8 enrolled
Summer 2023: STAT 583 Introduction to Probability and Statistics; 4 credit hours, 5 enrolled
Spring 2023: STAT 699 Special Study: Federated Learning; 4 credit hours, 3 enrolled
Winter 2023: STAT 699 Special Study: ML for Temporal and Dynamic Data; 4 credit hours, 5 enrolled
Winter 2023: STAT 587 DL Applied Probability and Statistical Analysis; 4 credit hours, 18 enrolled
Fall 2022: STAT 587 Applied Probability and Statistical Analysis; 4 credit hours, 32 enrolled,
Summer 2022: STAT 587 DL Applied Probability and Statistical Analysis; 4 credit hours, 7 enrolled
Summer 2022: STAT 699 Special Study: Federated Learning; 4 credit hours, 4 enrolled
Winter 2022: STAT 587 DL Applied Probability and Statistical Analysis; 4 credit hours, 28 enrolled
Fall 2021: STAT 521 Applied Statistical Data Analysis; 5 credit hours, 17 enrolled
Fall 2021: STAT 587 Applied Probability and Statistical Analysis; 4 credit hours, 37 enrolled
Summer 2021: STAT 583 Introduction to Probability and Statistics; 4 credit hours, 5 enrolled
Summer 2021: STAT 687 Mathematics and Theory of Reliability I; 4 credit hours, 1 enrolled
Spring 2021: STAT 525 DL Applied Statistics for Managers I; 4 credit hours, 1 enrolled

Open-Source Packages

piRF: **Prediction Intervals for Random Forests**: R package to deliver seven different prediction interval methods for random forest-based approaches.

fedht: **Federated Nonconvex Sparse Learning**: Implemented Flower baseline and aggregation strategy

for sparse models.

Peer-Reviewed Publications

Chancellor Johnstone, Eugene Ndiaye. (2025). Exact Conformal Inference for Multi-output Regression. *Proceedings of Machine Learning Research*. Accepted June 7, 2025

Gregory Barry, **Chancellor Johnstone**, Phillip Jenkins, William Caballero, Nathan Gaw. (2025). Student-Pilot Error Prediction via Multimodal Physiological Signals and Tree-Based Models. *IEEE Transactions on Cognitive and Development Systems*.

Devin Wasilevsky, William N. Caballero, **Chancellor Johnstone**, Nathan Gaw, Phillip R. Jenkins. (2024). Responsible Machine Learning for United States Air Force Pilot Candidate Selection. *Decision Support Systems*.

Alex Hoffendahl, **Chancellor Johnstone**, Alex Stephens, Richard Dill, Lance Champagne. (2024). Multi-Objective Multi-Commodity Flow Optimization for Wartime Planning with Cyber-Effects. *International Network Optimization Conference 2024*.

Haidong Gu, Nathan Gaw, Yinan Wang, Christine Beauchene, Sophia C. Yuditskaya, Hrishikesh M Rao, , **Chancellor Johnstone**, Chun-An Chou. (2024). A Hierarchical Heterogeneous Graph Generative Network Framework for Discovery of Multi-Modal Physiological Responses. *Proceedings of the 38th Annual AAAI Conference on Artificial Intelligence 2024*.

Gregory Barry, Elif Konyar, Brandon Harvill, **Chancellor Johnstone**. (2024). A Survey of Advances in Multimodal Federated Learning with Applications. *Multimodal and Tensor Data Analytics for Industrial Systems Improvement*.

Chancellor Johnstone, Dan Nettleton. (2023). Using Conformal Win Probability to Predict the Winners of the Canceled 2020 NCAA Basketball Tournaments. *The American Statistician*. (Accepted 8 Nov 2023)

Timothy Roche, Phillip Cho, Aihua Wood, **Chancellor Johnstone**. (2023). Anomaly Detection in the Molecular Structure of Gallium Arsenide Using Machine Learning. *Mathematics*.

William N. Caballero, Nathan Gaw, Phillip R. Jenkins, **Chancellor Johnstone**. (2023). Toward Automated Instructor Pilots in Legacy Air Force Systems: Physiology-based Flight Difficulty Classification via Machine Learning. *Expert Systems with Applications*.

Chancellor Johnstone, Bruce Cox. (2021). Conformal Uncertainty Sets for Robust Optimization. *Proceedings of Machine Learning Research*. 152, 72-90

Other Publications

Bethany Dorian, Takayuki Iguchi, **Chancellor Johnstone**, Christopher Chini. (2023). Deterioration Modeling Needs for Water Distribution Infrastructure. *Water Planning and Management*. (Accepted 28 June 2023)

Submitted Publications

Brian Popick, **Chancellor Johnstone**, Bruce Cox, Kyle Fitch, Nathan Gaw. (202X). Assessing the Calibration and Performance of Attention-based Spatiotemporal Neural Networks for Lightning Prediction. *IEEE Transactions on Automation Science and Engineering*.

Jacob Bryant, Bruce Cox, Nathan Gaw, William Caballero, **Chancellor Johnstone**. (202X). Federated Medical Scoring Systems. *Artificial Intelligence in Medicine*.

Students

Kyle Daley, Department of Operational Sciences **(Co-Advisor, In Progress)**

Cameron Sterrett, Department of Operational Sciences **(Co-Advisor In Progress)**

Zion Johnson, *Evaluating Performance of Conformal Prediction Produced Uncertainty Sets on Robust Optimization*, Department of Operational Sciences **(Co-Advisor)**

Haley Traub, *Machine Learning Techniques to Predict Solar Particle Events and Radiation of Aircrew*,

Department of Operational Sciences (Committee Member)

Sydney Wekamp, *Machine Learning Techniques to Detect Anomalies In T-38 Flight Sensor Data*, Department of Operational Sciences (Committee Member)

Greg Barry, Department of Operational Sciences (Committee Member, **In Progress**)

Jennifer Allsop, Department of Operational Sciences (Committee Member, **In Progress**)

Brian Popick, *Spatiotemporal Prediction of Atmospheric Events Through Recurrent Deep Learning Models*, Department of Operational Sciences (Committee Member)

Gregory Buchanan, Department of Operational Sciences (Committee Member)

Jacob Bryant, Federated Medical Scoring Systems, Department of Operational Sciences **(Advisor)**

Sung O, Department of Operational Sciences **(Advisor)**

Virbon Frial, Department of Operational Sciences (Committee Member)

Nolan Skelly, *An Improved Saliency Map that Shows Trustworthiness for Localizing Abnormalities in Medical Imaging*, Department of Operational Sciences (Committee Member)

Matthew Sauer, *Semi Supervised Federated Learning for Network Intrusion Detection*, Department of Operational Sciences (Committee Member)

Charles Woodrum, *Methods of Evaluating Quantum Phase Estimation Circuit Output*, Department of Mathematics and Statistics (Committee Member)

Greg Barry, *A Conformal Prediction Approach to Quantify Student Pilot Error via Multimodal Physiological Signals*, Department of Operational Sciences (Committee Member)

Mary Collins, *Induced Correlation and its Effects on the Performance of Fused Classification Systems*, Department of Mathematics and Statistics (Committee Member)

Byungmoo Kim, *Uncertainty Quantification in Federated Learning for Persistent Post-Traumatic Headache*, Department of Operational Sciences (Committee Member)

Brandon Harvill, *Hierarchical Federated Learning on Healthcare Data: An Application to Parkinson's Disease*, Department of Operational Sciences **(Advisor)**

Alex Stephens, *Adaptation of Network Flow Problems for Course of Action Generation*, Department of Electrical and Computer Engineering (Committee Member)

Gonzalo Hernando, *Modern Approaches and Theoretical Extensions to the Multivariate Kolmogorov Smirnov Test*, Department of Mathematics and Statistics (Committee Member)

Alex Contarino, *Constructing Prediction Intervals with Neural Networks*, Department of Operational Sciences (Committee Member)

Alex Hoffendahl, *Cyber Effects in Wargaming: The Cyber-Wargame Commodity Course of Action Automated Analysis Method (C-WCCAAM)*, Department of Operational Sciences **(Advisor)**

Funding

(P.I. is listed first.)

Christopher Chini, Takayuki Iguchi, **Chancellor Johnstone**, Justin Delorit. Data Analysis for Civil Infrastructure Sustainment and Resiliency, Air Force Office of Scientific Research. PoP Apr 2023 - Mar 2022. $39,600 (40%, $15,840). Co-PI. Grant to extend research related to USAF civil engineering sustainment through statistical methods.

Bruce Cox, **Chancellor Johnstone**. Fast Conformal Inference for Robust Optimization and Machine Learning, Air Force Office of Scientific Research. PoP Apr 2023 - Mar 2026. $120,736 (50%, $60,638). Co-PI. Grant to extend current research line focused on optimization under uncertainty.

Chancellor Johnstone, Nathan Gaw. Collaborative Cybersecurity with Federated Machine Learning, Air Force Institute of Technology Faculty Research Council. PoP Apr 2023 - Jun 2023. $23,330 (50%, $11,665). Co-PI. Seed grant to extend current research line focused on federated learning. Collaborating with teams at Army Cyber Institute (ACI) and AFRL/RIGA.

Chancellor Johnstone, Richard Dill. Rapidly Developing and Evaluating Wargaming Operational Decisions Under Fog, Air Force Research Lab/XPTW, 30 Apr 2022. PoP Oct 2022 - Sept 2023. $95,538 (50%,

$47,769). Extension of previous year's funding. Co-PI. Supported Alex Stephens, Brandon Harvill, among other students under collaborator.

Richard Dill, **Chancellor Johnstone**. Rapidly Developing and Evaluating Wargaming Operational Decisions Under Fog, Air Force Research Lab/XPTW, 30 Apr 2021. PoP April 2021 - Sept 2022. $49,220 (50%, $24,410). Executing research related to analytic and objective analysis of Courses of Action for network-based wargames. Co-PI. Supported Alex Hoffendahl, Alex Stephens and ANT Center, among other students under collaborator.

Chancellor Johnstone. Conformal Prediction for Uncertainty Set Generation, Air Force Institute of Technology Faculty Research Council, 4 Dec 2020. PoP Oct 2020 - Sept 2021. $6,500 (100%, $6,500). Project extends result related to uncertainty quantification and applies them to optimization under uncertainty.

Conference Presentations

(* indicates collaborator presenter.)

International Network Optimization Conference 2024: Multi-Objective Multi-Commodity Flow Optimization for Wartime Planning with Cyber-Effects

Military Operations Research Symposium 2023: Cyber-Wargaming Commodity Course of Action Analysis Method*

Institute of Industrial and Systems Engineers Annual Conference 2023: A Conformal Prediction Approach to Quantify Student Pilot Error via Multimodal Physiological Signals*

INFORMS Annual Meeting 2022:

- Data-Driven Robust Optimization with Conformal Prediction
- Federated Learning on Telemonitoring of Parkinson's Disease Patients*
- Multimodal Modeling for Post-traumatic Headache of Student Athletes*
- Predicting Flight Error for Pilot Training Using Explainable Multimodal Physiological Signals*

Air Force Operations Research Symposium 2022: Uncertainty Quantification: How bad (or good) is your model, really?

New England Symposium on Statistics in Sports 2021: Which Teams Might Have Won the 2020 NCAA Men's and Women's Basketball Tournaments?

Conformal and Probabilistic Prediction with Applications 2021: Conformal Uncertainty Sets for Robust Optimization.

Military Operations Research Symposium 2021: Conformal Prediction Approach to Multi-Response Prediction Regions.

Air Force Operations Research Symposium 2021: Multi-Response Conformal Prediction Regions for Robust Optimization.

Midwest Sports Analytics Meeting 2019: Nonparametric Prediction Intervals in Sports.

Air Force Operations Research Symposium 2017: Analysis in a Deployed Setting.

Military Operations Research Symposium 2016: Robust Basing Methodologies Responsive to Africa's Unpredictable Political Landscape.*

Military Operations Research Symposium 2016: Applying Robust Methodologies to RPA Basing Within the African Continent.*

Military Operations Research Symposium 2016: Improving Phase Scheduling Through Planning Factor Analysis.*

Invited Talks

AFIT Math and Stats Colloquium: Exact and Approximate Conformal Inference in Multi-Ouput Regression. Nov 2023.

Flower Summit 2023: Exploration of Federated Learning in the United States Air Force with Flower. May 2023.

Iowa State Sports Analytics Club: A Win Probability Application to March Madness. Mar 2023.

Lincoln Labs: CogPilot and Conformal Prediction. August 2022.

An Introduction to Conformal Inference. Mar 2022.

Iowa State Sports Analytics Club: A Win Probability Application to March Madness. Feb 2022.

Iowa State Sports Analytics Club: Predicting the Big Dance: A Win Probability Application to March Madness. Feb 2021.

Theoretical and Applied Data Science Lunch-n-Learn: Distribution Free Prediction Intervals. 2020

Certifications

Military Operations Research Society
Certificate in Cyber Wargaming *December 2021*

Service and Leadership

NeurIPS: Program Committee for Neurips 2024 Workshop on Statistical Frontiers in LLMs and Foundation Models

AISTATS: Reviewer for *Artificial Intelligence and Statistics Conference 2023*. (Top 10% of Reviewers)

INFORMS: Judge for Applied and Theoretical Best Paper Competition, 17th INFORMS Workshop on Data Mining and Decision Analytics.

MMI: Faculty Co-Advisor for Multi-Modal Integration Group (MMI) with Dr. Nathan Gaw, (ENS)

IST: Led multidisciplinary team to construct academic content for data scientist initial skills training.

CFC: **Combined Federal Campaign:** Acted as CFC liaison for Department of Mathematics and Statistics, Air Force Institute of Technology

STATCOM: **Statistics in the Community:** Provided analysis for Ames Public Library related to outreach and future planning. Volunteers at STEM Night for local elementary school.

STAT-ers: **Social Committee:** Acted as member of the STAT-ers Social Committee from Aug 2018 - May 2020. Responsible for all planning and execution of social events for entire Iowa State University Department of Statistics.