

# Colby T. Ford, Ph.D.

*Computational Biomathematician,  
Cloud AI Architect, & Data Scientist*

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## Education

### *The University of North Carolina at Charlotte*

- 2018 Doctor of Philosophy in Bioinformatics and Computational Biology  
*Advisor: Daniel Janies, Ph.D.*  
*Dissertation: An Integrated Phylogeographic Analysis of the Bantu Migration*  
*Wayland H. Cato Doctoral Fellow*
- 2015 Master of Science in Data Science and Business Analytics  
*Advisor: Mirsad Hadžikadić, Ph.D.*
- 2014 Bachelor of Arts in Applied Mathematics, Concentration in Statistics  
*Advisor: Mary Kim Harris, Ed.D.*  
*Coffey Scholar, C.L. Robbins Scholar*

## Industry Positions

### *BlueGranite*

Developed data platform and AI solutions using the Microsoft Azure cloud with services such as Azure Machine Learning Service, Cognitive Services, and Databricks (Apache Spark). Managed client engagements including requirements gathering, project planning, and budgeting. Hosted many training workshops and gave conference presentations and demonstrations on Microsoft advanced analytics technologies. Started and led the genomics practice, building scalable solutions for bioinformatics analyses in Azure. (BlueGranite.com/Genomics)

December 2020 - Present	Genomics Practice Lead
November 2018 - Present	AI Solution Architect
January 2017 - November 2018	Senior Data Scientist

### *Edge Systems - The HydraFacial Company*

Lead data science team through research and development initiatives related to IoT medical device informatics. Responsible for innovation with product marketing and engineering to improve and enhance technology products and processes. Implemented computer vision capabilities on the HydraFacial skin analyzer device for detection and classification of skin conditions.

July 2019 - March 2020 Director of Data Science

### *Ember.AI*

Developed a custom artificial intelligence engine for building state-of-the-art natural language processing models for fraud and compliance-related use cases. Built a large-scale, massively parallel processing architecture using Amazon Web Services and Databricks (Apache Spark) for interactive model training.

August 2018 - March 2020 Chief Data Scientist

*AmerisourceBergen - Lash Group*

Developed machine learning experiments and data analysis workflows to aid in client analytics. Created analysis pipelines for the discovery and understanding into patient drug adherence and rare disease drug access. Consulted in company data architecture including master data management and governance for future business strategy to grow value for client accounts.

February 2016 - February 2017 Senior Data Science Lead

*Mariner*

Consulted in the development of machine learning experiments, including parametric and non-parametric models, statistical predictions, and data mining. Built Azure cloud-based solutions for data collection, processing, and storage using Microsoft Azure Technologies such as Data Science Virtual Machines, Machine Learning Studio, Azure SQL Database, and more. Designed and created interactive visualizations for both dashboarding and reporting using Microsoft Power BI, Tableau Desktop & Tableau Server.

October 2014 - February 2016 Data Scientist

*Staples*

Managed store operations from labor planning, planograms, and inventory. Supervised store P&L of EasyTech department for technology, warranty, & repair service sales.

April 2011 - June 2014 Operations Supervisor & Tech Sales Supervisor

*Caldwell Hospice and Palliative Care*

Pioneered the transition from hand-written, paper medical forms to electronic data input and served as a database administrator. Worked closely with HIPAA and Medicare/Medicaid guidelines for data compliance.

August 2008 - December 2011 Medical Records Database Administrator

## Academic Positions

### *The University of North Carolina at Charlotte*

Teaching *Cloud Computing for Data Analysis* (DSBA 6190) for the Data Science Initiative Master's program. Received a funding grant from Microsoft to modernize and rebuild the course content on the Azure cloud platform.

Performing research in a broad range of fields in the bioinformatics and computational biology space including infectious diseases, epistasis, and human phylogenetics.

January 2019 - Present	Associate Faculty	School of Data Science
January 2019 - Present	Bioinformatics Researcher	Dept. of Bioinformatics and Genomics
April 2018 - December 2018	Postdoctoral Researcher	Dept. of Bioinformatics and Genomics
May 2016 - April 2018	Graduate Assistant	Dept. of Bioinformatics and Genomics

### *Northeastern University*

Taught a summer session of machine learning to graduate students in the LEVEL analytics program.

May 2015 - August 2015   Guest Lecturer   LEVEL

### *North Carolina New Schools*

Responsible for entire technology inventory: ordering, maintenance, management, etc. and maintained school website. Liaison between college & high school technology departments. Taught NCVPS mathematics courses, held additional teaching sessions in math and science and SAT & ACT preparation.

April 2014 - October 2014	Technology Facilitator	Caldwell Early College
April 2014 - October 2014	Mathematics Instructional Assistant	Caldwell Early College

## Publications

### Journal Articles

- J11. Gabriel Lopez Zenarosa, **Colby T. Ford**, David Brown, Kevin Smith, and Daniel Janies. Extraction of gene associations in colistin-resistant superbugs in *Escherichia coli*. *mBio*, 2020. In Progress
- J10. Colby T Ford, Gezahegn Alemayehu, Kayla Blackburn, Karen Lopez, Cheikh Cambel Dieng, Eugenia Lo, Lemu Golassa, and Daniel Janies. Modeling *Plasmodium falciparum* Diagnostic Test Sensitivity using Machine Learning with Histidine-Rich Protein 2 Variants. *medRxiv*, 2020. In Review
- J9. Anthony Ford, Daniel Kepple, Beka Raya Abagero, Jordan Connors, Richard Pearson, Sarah Auburn, Sisay Getachew, **Colby T. Ford**, Karthigayan Gunalan, Louis H. Miller, Daniel A. Janies, Julian C. Rayner, Guiyun Yan, Delenasaw Yewhalaw, and Eugenia Lo. Whole genome sequencing of plasmodium vivax isolates reveals frequent sequence and structural polymorphisms in erythrocyte binding genes. *PLOS Neglected Tropical Diseases*, 14(10):1–27, 10 2020
- J8. **Colby T. Ford**, Gabriel Lopez Zenarosa, Kevin B. Smith, David C. Brown, John Williams, and Daniel Janies. Genetic Capitalism and Stabilizing Selection of Antimicrobial Resistance Genotypes in *Escherichia coli*. *Cladistics*, 2020
- J7. **Colby T. Ford**, Jia Wen, Daniel Janies, and Xinghua Shi. A Parallelized Strategy for Epistasis Analysis Based on Empirical Bayesian Elastic Net Models. *Bioinformatics*, 03 2020. btaa216
- J6. **Colby T. Ford** and Daniel Janies. Ensemble machine learning modeling for the prediction of artemisinin resistance in malaria. *F1000Research*, 9(62), 2020
- J5. Adriano de Bernardi Schneider, **Colby T. Ford**, Reilly Hostager, John Williams, Michael Cioce, Ümit V. Catalyürek, Joel O Wertheim, and Daniel Janies. StrainHub: A phylogenetic tool to construct pathogen transmission networks. *Bioinformatics*, 08 2019
- J4. Wyatt T. Clark, Laura Kasak, Constantina Bakolitsa, Zhiqiang Hu, Gaia Andreoletti, Giulia Babbi, Yana Bromberg, Rita Casadio, Roland Dunbrack, Lukas Folkman, **Colby T. Ford**, David Jones, Panagiotis Katsonis, Kunal Kundu, Olivier Lichtarge, Pier L. Martelli, Sean D. Mooney, Conor Nodzak, Lipika R. Pal, Predrag Radivojac, Castrense Savojardo, Xinghua Shi, Yaoqi Zhou, Aneeta Uppal, Qifang Xu, Yizhou Yin, Vikas Pejaver, Meng Wang, Liping Wei, John Mould, Guoying Karen Yu, Steven E. Brenner, and Jonathan H. LeBowitz. Assessment of predicted enzymatic activity of  $\alpha$ -N-acetylglucosaminidase variants of unknown significance for CAGI 2016. *Human Mutation*, 40(9):1519–1529, 2019
- J3. **Colby T. Ford**, Aneeta Uppal, Conor M. Nodzak, and Xinghua Shi. Prediction of the effect of naturally occurring missense mutations on cellular N-acetyl-glucosaminidase enzymatic activity. *bioRxiv*, 2019
- J2. **Colby T. Ford**. An integrated phylogeographic analysis of the Bantu migration. *ProQuest Dissertations and Theses*, page 120, 2018
- J1. Daniel Janies, **Colby Ford**, Lambodhar Damodaran, and Zachae Faigen. Spread of Middle East Respiratory Coronavirus: Genetic versus epidemiological data. *Online Journal of Public Health Informatics*, 9(1), 2017

### Conference Papers and Presentations

- C7. Cheikh Cambel Dieng, **Colby T. Ford**, Dickson Doniou, Jennifer Huynh, Lerch Anita, Daniel Janies, Linda Amoah, Yaw Afrane, and Eugenia Lo. Population structure and selection-mediated changes in *Plasmodium falciparum* by next-generation sequencing. *Annual Meeting of the American Society of Tropical Medicine and Hygiene*, 2020
- C6. **Colby T. Ford**. Visualizing transmission networks of pathogens using phylogenetic data with StrainHub. *I Meeting of Systematics, Biogeography, and Evolution - Symposium of Virology in the SARS-CoV-2 era*, 2020
- C5. Daniel Janies, **Colby T. Ford**, Kevin Smith, Gabriel Lopez Zenarosa, and John Williams. Evolution of gain and loss of antimicrobial resistance genes in *Escherichia coli*. *XXXVIII Annual Meeting of the Willi Hennig Society*, 2019
- C4. Kevin Smith, **Colby T. Ford**, Gabriel Lopez Zenarosa, John Williams, and Daniel Janies. Phylogenetic analysis of the genetic variation of multi-drug resistant *Escherichia coli*. *National Council on Undergraduate Research*, 2019
- C3. Jia Wen, **Colby T. Ford**, Daniel Janies, and Xinghua Shi. New strategies toward scaling up epistasis analysis on large-scale genomic datasets. *ACM Conference on Bioinformatics, Computational Biology, and Health Informatics*, 2018
- C2. **Colby T. Ford** and Andy Lathrop. Predictive modeling of vegetation density using R and a cloud data platform. *Analytics for Social Good, University of Cincinnati*, 2017
- C1. **Colby T. Ford**, Ming Xue, Peter M. Whiteley, Ward Wheeler, Daniel A. Janies, and Xinghua Shi. Visualizing linguistic disparity of Uto-Aztecan languages and Bantu languages. *Society for Anthropological Sciences Annual Meeting*, 2016

### Software and Coding

- S2. Adriano de Bernardi Schneider, **Colby T. Ford**, Reilly Hostager, John Williams, Michael Cioce, Ümit V. Catalyürek, Joel O Wertheim, and Daniel Janies. StrainHub: A phylogenetic tool to construct pathogen transmission networks. *Bioinformatics*, 08 2019
- S1. **Colby T. Ford**, Jia Wen, Daniel Janies, and Xinghua Shi. A Parallelized Strategy for Epistasis Analysis Based on Empirical Bayesian Elastic Net Models. *Bioinformatics*, 03 2020. btaa216

### Books and Chapters

- C1. Cheikh Cambel Dieng, Colby T. Ford, Jennifer Huynh, Linda E. Amoah, Yaw A. Afrane, Daniel A. Janies, and Eugenia Lo. Progress in *Plasmodium* genomics and current challenges in malaria control. In *TBD*. IntechOpen, 2021. In Progress
- E1. **Colby T. Ford**. *Sparkitecture - A collection of "cookbook-style" scripts for simplifying data engineering and machine learning in Apache Spark*. GitBook, October 2019
- B1. **Colby Ford**. *Caesura - late-intermediate piano technique book*. Lulu, March 2010. ISBN: 978-0-557-36832-7

## Other Professional Contributions

### Professional Blog Posts:

- B24. **Colby T. Ford.** Event Recap: Shape your Future with Azure Data and Analytics, 2020. *BlueGranite Technical Blog*
- B23. **Colby T. Ford.** Reading Bioinformatics and Genomics Files in Power BI, 2020. *BlueGranite Technical Blog*
- B22. Jon Gore, Thomas J. Weinandy, and **Colby T. Ford.** Take Back Your Data to Gain a Competitive Advantage, 2020. *BlueGranite Technical Blog*
- B21. **Colby T. Ford.** A BlueGranite Blog Post Written (Mostly) by AI, 2020. *BlueGranite Technical Blog*
- B20. **Colby T. Ford.** Give Your Genomics Pipeline a \*Glow\* Up in Azure Databricks, 2020. *BlueGranite Technical Blog*
- B19. **Colby T. Ford.** SIR Modeling on Azure: COVID-19 Hospital Impact Model for Epidemics, 2020. *BlueGranite Technical Blog*
- B18. **Colby T. Ford.** Let's Talk About COVID-19, 2020. *BlueGranite Technical Blog*
- B17. **Colby T. Ford.** Comparing Azure Machine Learning Service and Azure Databricks, 2020. *BlueGranite Technical Blog*
- B16. **Colby T. Ford.** Recap of rstudio::conf(2020) for Data Science and Machine Learning, 2020. *BlueGranite Technical Blog*
- B15. **Colby T. Ford.** Scaling your Genomics Pipeline in the Cloud with Azure Databricks, 2019. *BlueGranite Technical Blog*
- B14. **Colby T. Ford.** Migrating & Scaling Machine Learning Models to Azure Databricks for Cloud-Powered AI, 2019. *BlueGranite Technical Blog*
- B13. **Colby T. Ford.** Introducing the Databricks Unified Analytics Platform for Genomics, 2018. *BlueGranite Technical Blog*
- B12. **Colby T. Ford.** Recap: Spark+AI Summit 2018, 2018. *BlueGranite Technical Blog*
- B11. **Colby T. Ford.** Cognitive Services Showcase: API Search Tools, 2018. *BlueGranite Technical Blog*
- B10. **Colby T. Ford.** Let Azure do the Heavy Lifting on Your AI Workload, 2018. *BlueGranite Technical Blog*
- B9. **Colby T. Ford.** Recap of rstudio::conf 2018, 2018. *BlueGranite Technical Blog*
- B8. **Colby T. Ford.** Microsoft Azure & Databricks = Cloud-Scale Spark Power, 2017. *BlueGranite Technical Blog*
- B7. **Colby T. Ford.** Maximize Your Customer Retention by Predicting Customer Churn, 2017. *BlueGranite Technical Blog*
- B6. **Colby T. Ford.** Become the Maestro of your Genomics Workflow with Bioconductor and Microsoft R Server, 2017. *BlueGranite Technical Blog*
- B5. **Colby T. Ford.** Publishing Predictive Web Services with Microsoft R Server, 2017. *BlueGranite Technical Blog*
- B4. **Colby T. Ford.** Data Visualization for Bioinformatics with R in Power BI, 2017. *BlueGranite Technical Blog*
- B3. **Colby T. Ford.** Webinar Recap: Distributed Computing & R Server, 2017. *BlueGranite Technical Blog*
- B2. **Colby T. Ford.** SAS Enterprise Guide vs. Microsoft Azure Machine Learning, 2017. *BlueGranite Technical Blog*
- B1. **Colby T. Ford.** Importing and Exporting: Getting Data Into and Out of R, 2017. *BlueGranite Technical Blog*

## Technical Articles:

- TA5. **Colby T. Ford.** Better evaluate COVID-19 test performance using Bayes factors, Dec 2020. Medium
- TA4. **Colby T. Ford.** Assessment of retail out-of-stock conditions using statistical inference. Technical report, Mariner, 2016
- TA3. **Colby T. Ford** and Wayne Snyder. Revenue protection using machine learning for utilities management. Technical report, Mariner, 2015
- TA2. **Colby T. Ford.** The allure of machine learning, now within reach in Microsoft Azure. Technical report, Mariner, 2015
- TA1. **Colby T. Ford.** Demand forecasting using machine learning to reduce working capital. Technical report, Mariner, 2015

## Conferences, Training, and Speaking Engagements

Nov. 2014	Microsoft Roadmap Event	<i>Speaker</i>	Charlotte, NC
Sep. 2015	Microsoft Cortana Analytics Conference	<i>Attendee</i>	Seattle, WA
Sep. 2016	Advanced Pharma Analytics	<i>Attendee</i>	Newark, NJ
Feb. 2017	Analytics for Social Good - U. Cincinnati	<i>Speaker</i>	Cincinnati, OH
Mar. 2017	Society for Applied Anthropology Conference	<i>Speaker</i>	Santa Fe, NM
Mar. 2017	BlueGranite Distributed Computing Webinar	<i>Speaker</i>	Online
Oct. 2017	BlueGranite Retail Webinar	<i>Speaker</i>	Online
Nov. 2017	Nissan Analytics Expo	<i>Speaker</i>	Nashville, TN
Jan. 2018	rstudio::conf(2018)	<i>Attendee</i>	San Diego, CA
Jun. 2018	Spark + AI Summit 2018	<i>Attendee</i>	San Francisco, CA
Sep. 2018	Big Data Ignite	<i>Speaker</i>	Grand Rapids, MI
Sep. 2018	Microsoft Ignite	<i>Attendee</i>	Orlando, FL
Jan. 2019	rstudio::conf(2019)	<i>Attendee</i>	Austin, TX
Mar. 2019	Microsoft Azure AI Hackfest	<i>Attendee</i>	New York, NY
Apr. 2019	Azure Databricks Training Event	<i>Speaker</i>	Chicago, IL
May 2019	CECHS Commencement	<i>Speaker</i>	Lenoir, NC
Jun. 2019	BlueGranite Azure Databricks Retail Webinar	<i>Speaker</i>	Online
Jun. 2019	Azure Databricks Training Event	<i>Speaker</i>	Charlotte, NC
Jun. 2019	Azure Databricks Training Event	<i>Speaker</i>	Detroit, MI
Jul. 2019	Databricks Retail Webinar	<i>Speaker</i>	Online
Oct. 2019	UNCC CCI Ph.D. Open House Panel	<i>Panelist</i>	Charlotte, NC
Nov. 2019	UNCC Data Science Initiative Git Workshop	<i>Speaker</i>	Charlotte, NC
Jan. 2020	PyData Charlotte	<i>Speaker</i>	Charlotte, NC
Jan. 2020	rstudio::conf(2020)	<i>Attendee</i>	San Francisco, CA
Apr. 2020	WBTV COVID-19 Interview	<i>Interviewee</i>	Online
May 2020	CBS News COVID-19 Interview	<i>Interviewee</i>	Online
May 2020	UCSD HIV Dynamics Conference	<i>Speaker</i>	Online
Jun. 2020	Spark + AI Summit 2020	<i>Speaker/Panelist</i>	Online
Jul. 2020	SBE Symposium: Virology in the SARS-CoV-2 era	<i>Speaker</i>	Online
Aug. 2020	BlueGranite Scaling Genomic Analyses in Azure Webinar	<i>Speaker</i>	Online
Sep. 2020	TEDx UNCCCharlotte	<i>Speaker</i>	Charlotte, NC
Oct. 2020	BlueGranite Loan Risk Analysis Webinar	<i>Speaker</i>	Online
Jan. 2021	rstudio::global(2021)	<i>Attendee</i>	Online

## Professional Memberships

2013-Present	The Society for Industrial and Applied Mathematics
2014-Present	The American Statistical Association
2015-2017	UNCC Data Science Initiative Advisory Board
2015-2016	Northeastern University LEVEL Advisory Board
2016-2017	The Society for Anthropological Sciences
2018-2019	American Association for the Advancement of Science
2020-Present	International Society for Computational Biology

## Advising

Jan. 2020 - May 2020	Kovidh Vegesna	DSBA MS Practicum Internship
May 2020 - Sep. 2020	Somesh Kale	Amissa Developer Internship
May 2020 - Sep. 2020	Heet Detroja	Amissa Developer Internship
May 2020 - Sep. 2020	Chaitanya Darade	Amissa Developer Internship
Sep. 2020 - Dec. 2020	Adesoji Ademiluyi	Bioinformatics Research Assistantship
Sep. 2020 - Dec. 2020	Eh So Wah	Amissa Developer Internship

## Certifications

May 2018	Databricks Certified Developer - Apache Spark 2.x for Python	Certification #: 53873
Nov. 2019	Microsoft Azure Data Scientist Associate (DP-100)	Exam Writer
Dec. 2019	CITI Program - Biomedical Researcher (IRB)	Record ID: 34535340
Dec. 2019	CITI Program - Data or Specimens Only Research (IRB)	Record ID: 34853732
Sep. 2020	Microsoft Data Science Partnership Program - Custom Core Certification	
Oct. 2020	Microsoft Azure AI Engineer Associate (AI-100)	Certification #: H532-5207
Oct. 2020	Microsoft Azure AI Fundamentals (AI-900)	Certification #: H533-2414
Nov. 2020	Databricks Partner Program - Developer Champion	Certification #: 917207
Nov. 2020	CITI Program - Animal Biosafety	Record ID: 39539397
Nov. 2020	CITI Program - Laboratory Personnel BSS	Record ID: 39539395
Nov. 2020	CITI Program - USDA Permits	Record ID: 39539400
Nov. 2020	CITI Program - Animal Biosafety	Record ID: 39539397
Nov. 2020	CITI Program - Shipping and Transport of Regulated Biological Materials	Record ID: 39539399
Nov. 2020	CITI Program - Principal Investigators BSS	Record ID: 39539394
Nov. 2020	CITI Program - Institutional Biosafety Committee (IBC) Members BSS	Record ID: 39539396

## Skills

Languages:	R • Python • SQL • SAS • Visual Basic • Javascript
Distributed Computing:	Spark (Databricks) • Hadoop • MPI • SNOW
Cloud Computing:	Microsoft Azure • AWS • Docker/Kubernetes
Visualization:	Tableau • Power BI • Shiny • D3.js
Markup/Web:	Markdown • L <sup>A</sup> T <sub>E</sub> X • HTML5 • CSS3



## Funding

Sep. 2021 - Aug. 2026	NSF NAIRI	AI Institute: Explainable Machine Learning of Biological Structure and Function	\$42,395	Pending	Co-I
Jan. 2021 - Dec. 2023	UNC System ROI	Modelling Pathogenicity, Zoonosis, and Host Factors in Microbial Communities Using Data Science and Empirical Approaches	\$1,500,000	Pending	Co-PI
Jan. 2021 - Dec. 2022	NIH RADx-RAD	Exhaled Breath Analysis and Relationships Among Volatile Organic Compounds in SARS-CoV-2 Infection Using Deep Learning in Athletes and Non-Athletes	\$2,529,967	Pending	Co-I
Jul. 2020 - Jun. 2022	Google.org	A Novel Deep Learning Modeling - Transfer Learning (DL-TL) Paradigm to Accurately Characterize the COVID-19 Pandemic Across Scales.	\$321,000	Pending	Co-PI
Apr. 2020- May 2020	Microsoft	COVID-19 Research on Azure	\$35,000	Funded	PI
May 2020 - Dec. 2020	UNCC SDS Seed Grant	Analytical Modeling of IoMT data to predict onset and progression of Alzheimer's	\$20,000	Funded	Co-PI
Jan. 2019 - May 2019	Microsoft	Azure Funding for Cloud Computing Course	\$30,000	Funded	PI
Oct. 2014 - Present	Microsoft	Various Business Incentive Funds (BIF), Partner Investment Engine (PIE) Funds, GoFast Funding, and End Customer Investment Funds (ECIF).	>\$400,000	Funded	PI

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[www.colbyford.com](http://www.colbyford.com)