

C. Carlo Fazioli

Curriculum Vitae

Washington D.C.

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I am an applied mathematician and software engineering generalist with experience in cloud computing, AI, and DevOps. I am a lifelong learner with far-ranging interests, confident in my ability to rapidly spin up in new environments, as well as deep-dive into the gritty details. In 2021, I made it onto the Advent Of Code global leaderboard!

Current Position

2018 – Present **Software Engineer**, *Group W, Inc.*, Vienna VA.

Presently, Product Owner migrating a Kubernetes application from a privately controlled compute cluster to Microsoft Azure.

- Initially created and currently maintaining the DevOps pipeline:
 - Git branching strategy
 - Issue management
 - Azure infrastructure deployment
 - Source code and Docker image builds
 - Testing and QA
 - Application installation
 - Technical documentation
- Architected and currently maintaining the application's cloud infrastructure:
 - Virtual Networking
 - DNS Zones
 - Kubernetes Cluster
 - Docker Container Registry
 - Azure Active Directory
 - Security Principals
- Utilizing modern toolchain:
 - Git and GitLab CI/CD
 - Azure ARM Templates
 - Kubernetes and Helm
 - Let's Encrypt SSL Certificates

Previously, developer on a 2021 MORS Barchi-prize-winning, multi-year, multi-million dollar DARPA contract to develop an AI wargaming application deployed to a 11-node, 1,240-CPU cluster.

- Architected microservices, their interfaces, and their implementations as Kubernetes objects.
- Designed AI algorithms under senior mathematician's guidance, using reinforcement learning, feature engineering, TensorFlow neural networks, and Monte Carlo Tree Search.
- Wrote application source code in python, including REST API with Django, database interfaces with PyMongo, and custom libraries.
- Acted as Agile Team Leader, managing GitLab issues, branching strategy, merging strategies and timelines, package releases, and CI/CD pipelines for a team of 10.
- Administrated multiple MongoDB instances (each 10GB-1TB) from the mongo shell, and with PyMongo.

Education

2006 – 2009 **Ph.D. Mathematics**, *University of Illinois at Chicago*, Chicago IL.

2005 – 2006 **M.S. Mathematics**, *University of Illinois at Chicago*, Chicago IL.

2000 – 2004 **B.S. Mathematics**, *University of San Francisco*, San Francisco CA.

Previous Positions

2016 – 2018 **Econometric Modeler**, *International Monetary Fund*, Washington DC.

Collaborated with IMF economists on economic model development; researched, designed, and implemented algorithms for use by IMF staff; pursued exploratory research into technology solutions for IMF institutional needs; addressed technical needs of individual IMF staff.

- Researched Monte Carlo techniques to approximate game-theoretical quantities, resulting in substantial runtime improvements
- Authored user software to assist economists in global systemic risk valuations
- Developed working knowledge of AWS, including IAM, VPC, EC2, and S3, for internal pilot program

- 2013 – 2016 **Assistant Teaching Professor**, *Dept. of Mathematics*, Drexel University, Philadelphia, PA.
Developed course and lab materials; lectured, graded exams, monitored students' use of online resources, assigned final grades; assisted students as needed outside of class or in office hours; directed teaching assistants.
- Complex Variables and Vector Analysis (Spring 2014)
 - Differential Equations (Winter 2014, Spring 2015, Winter 2016)
 - Linear Algebra (Fall 2013, Winter 2014, Winter 2015, Spring 2016)
 - Discrete Math (Summer 2014)
 - Multivariable Calculus, Calculus II, Precalculus, Math 101 (multiple quarters)
- 2011 – 2013 **Postdoctoral Research Associate**, *Dept. of Mathematical Sciences*, New Jersey Inst. of Tech., Newark, NJ.
Researched, designed, and coded novel algorithms for use in fluid dynamics simulations; briefed research supervisor; presented findings to collaborators and conference attendees.
- Surveyed recent research literature
 - Communicated and collaborated with supervisors to develop research program
 - Drafted, wrote, revised, and debugged new numerical algorithms
- 2011 – 2012 **Lecturer**, *DMS*, NJIT, Newark, NJ.
Worked with course coordinators to develop course materials; lectured courses, graded exams, monitored students' use of online resources; assisted students as needed outside of class or in office hours.
- Differential Equations (Fall 2011)
 - Honors Multivariable Calculus (Spring 2012)
- 2009 – 2011 **Lecturer**, *Dept. of Math, Stats, and Comp. Sci.*, UIC, Chicago, IL.
Worked with course coordinators to develop course materials; lectured courses, graded exams, monitored students' use of online resources; assisted students as needed outside of class or in office hours. Directed teaching assistants in designing and administering discussion sections and quizzes.
- Linear Algebra course coordinator (Spring 2011)
 - Linear Algebra (Fall 2010, Spring 2010, Fall 2009)
 - Differential Equations (Spring 2011)
 - Multivariable Calculus (Fall 2010, Fall 2009)
- 2007 – 2009 **Graduate Student Lecturer**, *MSCS*, UIC, Chicago, IL.
Lectured courses; wrote and graded exams; assisted students as needed during office hours and scheduled meetings; assigned final grades.
- Linear Algebra (Spring 2008)
 - Multivariable Calculus (Spring 2009, Fall 2007)
- 2005 – 2009 **Teaching Assistant**, *MSCS*, UIC, Chicago, IL.
Led discussion sections; created and graded quizzes; assisted students as needed in office hours and department tutoring center.
- Linear Algebra (Summer 2007)
 - Differential Equations (Summer 2006)
 - Calculus II (Fall 2008, Summer 2008, Spring 2005)
 - Calculus I (Spring 2008, Spring 2007, Fall 2006, Spring 2006, Fall 2005)
 - Calculus I Emerging Scholars Program (Spring 2007, Fall 2006)
- 2002 **Supplemental Instruction Tutor**, *Dept. of Mathematics*, USF, San Francisco, CA.
Attended lectures and took notes for undergraduate courses; hosted drop-in peer tutoring sessions.
- Calculus I (Spring 2002)
 - Introduction to Statistics (Fall 2002)

Publications

- M. Booty, C. Fazioli, M. Siegel. "A New Algorithm for Efficient Computation of Moving Fluid Interfaces." (in progress)
- C. Fazioli, D. Nicholls. "Stable Computations of Variations of Dirichlet-Neumann Operators." *Journal of Computational Physics*, Volume 229, Number 3, 906-920 (2010)
- C. Fazioli, D. Nicholls. "Parametric Analyticity of Functional Variations of Dirichlet-Neumann Operators." *Differential and Integral Equations*, Volume 21, Number 5-6, 541-574 (2008)

Invited Talks

- 2014 *Overlapping Patches for Dynamic Surface Problems*, Conference on Hamiltonian PDE, The Fields Institute for Research in Mathematical Sciences, University of Toronto, Toronto, Ontario, Canada
- 2012 *Overlapping Patches for Dynamic Surface Problems*, Applied Math Seminar, Department of Mathematics, Drexel University, Philadelphia PA
- 2009 *Functional Variations of the Dirichlet-Neumann Operator*, IMACS Conference, University of Georgia, Athens GA
- 2009 *Functional Variations of the Dirichlet-Neumann Operator*, AMS Sectionals Meeting, University of Illinois at Urbana-Champaign, Urbana-Champaign IL

Conferences Attended

- 2020 Rigetti Advantage 2020 Sacramento CA
- 2019 IBM Q Summit Yorktown Heights NY
- 2018 D-Wave Systems Qubits 2018 Knoxville TN
- 2017 D-Wave Systems Qubits 2017 National Harbor MD
- 2014 Joint Mathematics Meetings, Baltimore MD
- 2014 Conference on Hamiltonian PDE, Toronto, Ontario, Canada
- 2012 Frontiers in Applied and Computational Mathematics, NJIT, Newark NJ
- 2011 Joint Mathematics Meetings, New Orleans LA
- 2009 IMACS Conference, University of Georgia, Athens GA
- 2009 AMS Sectionals, University of Illinois at Urbana-Champaign, Urbana-Champaign IL
- 2009 Joint Mathematics Meetings, Washington DC
- 2005 3-Manifolds and Knot Theory Conference, University of Texas at Austin, Austin TX
- 2005 Algebraic Geometry, Symplectic Geometry and Theoretical Physics: A Conference Celebrating the Contributions of Women Researchers, Philadelphia PA

Service

- 2019 – 2020 Computer Science Team Intern Mentor, Group W and George Mason University, Vienna VA
- 2018 – 2019 Quantum Computing Individual Intern Mentor, Group W, Vienna VA
- Summer 2015 'Students Tackling Advanced Research' Faculty Mentor, Drexel University, Philadelphia PA
- 2014 – 2015 Teaching Innovations Committee Head, Drexel University, Philadelphia PA
- 2008 – 2009 Faculty Partner, UIC, Chicago IL
- Spring 2005 Associate Organizer, Bay Area Math Meet, USF, San Francisco CA
- Spring 2004 Student Volunteer, BAMM, USF, San Francisco CA

Hobbies and Interests

- Solving the NYT crossword puzzle daily
- Running, cycling, and yoga
- Cloud computing
- Science fiction lit/TV/movies
- Advent of Code and CTFs
- Bug bountying and cybersecurity
- MCU and embedded systems
- Quantum computing