C. Carlo Fazioli

Curriculum Vitae

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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.

Current Position

2018 – 2024   **Software Engineer**, *Group W, Inc*, Vienna VA

Product manager of, and contributor to, an AI wargaming application developed as a multi-year, multimillion-dollar Defense Advanced Research Projects Agency seedling project between 2019-2021 before transitioning to further development under the Air Force Research Laboratory. Project was awarded the 2021 Military Operations Research Society Barchi prize.

- ○ Product management:
  - Iterated frequently with client-side management and SMEs to understand evolving priorities.
  - Coordinated with client and developers to produce task orders and accurate level-of-effort estimates.
  - Communicated with corporate admins to track budget use.
  - Authored monthly status reports and annual final reports.
  - Presented at conferences and during networking calls to spread awareness of team efforts.
- ○ Cloud-native Architecture:
  - Architected microservices and their interfaces.
  - Designed two deployment mechanisms: Kubernetes and Docker.
  - Managed Kubernetes objects using Helm.
  - Defined cloud resource requirements with Infrastructure as Code.
- ○ Agile Development:
  - Acted as unofficial Agile Team Leader for a team of 10.
  - Assembled a robust GitLab CICD Pipeline.
  - Facilitated uniform development workflows with a custom Docker image.
- ○ Software Engineering:
  - Designed AI algorithms under a senior staff guidance.
  - Implemented a from-scratch K-medoids algorithm to cluster wargame state data.
  - Authored application source code in Python.
  - Detailed significant portions of the project in technical documentation.
  - Constructed a REST API and Software Development Kit.
- ○ System Administration:
  - Controlled application access using Azure AD for corporate users, and Keycloak for external users
  - Administrated multiple MongoDB instances (each 10GB-1TB)

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

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

Collaborated with IMF economists on global 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.

- Linear Algebra (Fall 2013, Winter 2014, Winter 2015, Spring 2016)
- Differential Equations (Winter 2014, Spring 2015, Winter 2016)
- Complex Variables and Vector Analysis (Spring 2014)
- 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.

- Honors Multivariable Calculus (Spring 2012)
- Differential Equations (Fall 2011)

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)
- Differential Equations (Spring 2011)
- Linear Algebra (Fall 2010, Spring 2010, Fall 2009)
- Multivariable Calculus (Fall 2010, Fall 2009)

2007 – 2009 **Graduate Student Lecturer**, *MSCS*, UIC, Chicago, IL

Lectured courses; wrote and graded exams; assissted 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.
- Calculus II (Fall 2008, Summer 2008, Spring 2005)
- Calculus I (Spring 2008, Spring 2007, Fall 2006, Spring 2006, Fall 2005)
- Linear Algebra (Summer 2007)
- Calculus I Emerging Scholars Program (Spring 2007, Fall 2006)
- Differential Equations (Summer 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.
- Introduction to Statistics (Fall 2002)
- Calculus I (Spring 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

2023	*A Study in Human-Machine Teaming*, Trusted AI & Autonomy Defense Technology Review, MITRE, McLean VA
2023	*An AI-Enabled Wargaming Application for the Cloud*, Air Force Research Laboratory Modeling and Reasoning AI Hub, MITRE, McLean VA
2023	*An AI-Enabled Wargaming Application for the Cloud*, Air Force Research Laboratory Project Portfolio Session, Balston VA
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

2022	Air Force Research Laboratory Modeling and Reasoning AI Hub Workshop, *Online*
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, Newark NJ
2011	Joint Mathematics Meetings, New Orleans LA
2009	IMACS Conference, Athens GA
2009	AMS Sectionals, Urbana-Champaign IL
2009	Joint Mathematics Meetings, Washington DC
2005	3-Manifolds and Knot Theory Conference, Austin TX
2005	Algebraic Geometry, Symplectic Geometry and Theoretical Physics: A Conference Celebrating the Contributions of Women Researchers, Philadelpha PA

Service

2019 – 2020	Computer Science Intern Team Mentor, Group W and George Mason University, Vienna VA
2018 – 2019	Quantum Computing Intern Individual 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: I am on 401 day streak at the time of this writing!
- Mindfullness: striving frequent meditator and proponent of mental health.
- Science fiction lit/TV/movies: I'm a fan of classic authors such as Phil K. Dick, contemporary authors such as Neal Stephenson, and the '80s and '90s campiness of movie director Paul Verhoeven.
- Coding competitions: I made it onto the 2021 Advent of Code global leaderboard!
- Cybersecurity: Avid listener of Risky Biz and Darknet Diaries podcasts; amateur malware analyst.