Curriculum Vitae

Christopher G. Brinton, PhD

Contact Information

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Professional Experience

Princeton University, Princeton, NJ
Associate Director of the EDGE Lab *Sept 2018 – Present*
Lecturer of Electrical Engineering *Sept 2017 – Present*

- The Princeton EDGE Lab (scenic.princeton.edu) is devoted to research, education, and innovation in edge computing, edge networking, and data science. It has graduated over 30 PhD students and postdocs.
- I conduct research in data science for networking, publishing papers with students in venues such as IEEE Transactions on Networking, Transactions on Signal Processing, and Conference on Computer Communications.
- I teach 3-4 courses each year, including Networks: Friends, Money, and Bytes which covers data science, optimization, and algorithms for social, technological, and economic networks.

Zoomi Inc., Chesterbrook, PA (www.zoomiinc.com)
Head of Advanced Research *May 2016 – Present*
Consulting Head of Research *Feb 2014 – May 2016*
Co-founder *Jun 2013 – Present*
Research Intern *Jun 2013 – Aug 2013*

- Zoomi is a big data startup company that provides predictive analytics and individualized learning for employee performance optimization. It is currently serving 2000 corporate training courses in Fortune 500 companies.
- I co-founded Zoomi based on my research pertaining to Social Learning Networks (SLN), and have led a team of 7 full-time, four part-time, and 9 summer intern data science researchers.
- I have also played substantial roles in customer support, messaging, and product demonstrations.

The College of New Jersey, Ewing, NJ
Adjunct Professor of Engineering *Aug 2016 – May 2017*

Education

Princeton University, Princeton, NJ
Doctor of Philosophy in Electrical Engineering *May 2016*

- Research on data science and networking resulted in several papers, invited talks, and a startup company. PhD thesis won the *2016 Bede Liu Best Dissertation Award in Electrical Engineering*.
- First author of textbook *The Power of Networks: Six Principles That Connect Our Lives*, which was profiled in several media such as TIME and is being used to teach courses around the world.
- Co-instructor of three online courses to over 400,000 students, and lead TA of an in-class course.

Masters Degree in Electrical Engineering – GPA 3.86/4.00 *May 2013*

- Data Science/Optimization Courses: Linear Optimization, Linear Systems Theory, Advanced Optimization, Computational Stochastic Optimization, Random Processes in Information Systems

- Networking/Communications Courses: Advanced Computer Networks, Advanced Topics in Social / Technical / Economic Networks, Lightwave Communications

The College of New Jersey, Ewing, NJ
Bachelor of Science in Electrical Engineering – GPA 3.98/4.00 *May 2011*

- Valedictorian of the School of Engineering, Summa Cum Laude

Publications

Books

C. Brinton, M. Chiang. The Power of Networks: Six Principles that Connect our Lives. *Princeton University Press*, 2016. `www.powerofnetworks.org`.

C. Brinton, M. Chiang. Networks Illustrated: 8 Principles Without Calculus. *EdWiser Scholastic Press*, 2013.

Journal Papers

C. Brinton, S. Buccapatnam, L. Zheng, D. Cao, A. Lan, F. Wong, S. Ha, M. Chiang, H. V. Poor. On the Efficiency of Online Social Learning Networks. To appear, *IEEE/ACM Transactions on Networking*, 2018.

W. Chen, C. Brinton, D. Cao, M. Chiang. Early Detection Prediction of Learning Outcomes in Online Short-Courses via Learning Behaviors. To appear, *IEEE Transactions on Learning Technologies*, 2018.

T. Yang, C. Brinton, C. Joe-Wong, M. Chiang. Behavior-Based Grade Prediction for MOOCs via Time Series Neural Networks. *IEEE Journal of Selected Topics in Signal Processing*, Vol. 11, No. 5, p. 716-728, 2017.

C. Brinton, S. Buccapatnam, M. Chiang, H. V. Poor. Mining MOOC Clickstreams: Video-Watching Behavior versus In-Video Quiz Performance. *IEEE Transactions on Signal Processing*, Vol. 64, No. 14, p. 3677-3692, 2016.

C. Brinton, R. Rill, S. Ha, M. Chiang, R. Smith, W. Ju. Individualization for Education at Scale: MIIC Design and Preliminary Evaluation. *IEEE Transactions on Learning Technologies*, Vol. 8, No. 1, p. 136-148, 2015.

C. Brinton, M. Chiang, S. Jain, H. Lam, Z. Liu, F. Wong. Learning about social learning in MOOCs: From statistical analysis to generative model. *IEEE Transactions on Learning Technologies*, Vol. 7, No. 4, p. 346-359, 2014.

K. Reichmann, P. Iannone, C. Brinton, et al. A Symmetric-Rate, Extended-Reach 40Gb/s CWDM-TDM PON with Downstream and Upstream SOA-Raman Amplification. *IEEE Journal of Lightwave Technology*, Vol. 30, No. 4, p. 479-485, 2012.

C. Brinton, M. Wharton, A. Katz. Design and Demonstration of a Passive, Broadband Equalizer for an SLED. *IEEE Microwave Journal*, 2012.

C. Brinton, D. Hirsh. Sensitivity Enhancement in Continuous-Wave Electron Paramagnetic Resonance: Adaptive Signal Averaging versus a Moving Average. *Review of Scientific Instruments*, Vol. 81, No. 2, 2010.

Conference Papers

T. Yang, C. Brinton, P. Mittal, M. Chiang, A. Lan. Learning Informative and Private Representations via Generative Adversarial Networks. *IEEE Big Data*, 2018.

A. Lan, C. Brinton, J. Spencer, Z. Chen, M. Chiang. A Probabilistic Model for MOOC Discussion Forums. *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD)*, 2018.

W. Chen, C. Joe-Wong, C. Brinton, L. Zheng, D. Cao. Principles for Assessing Adaptive Online Courses. *EDM*, 2018.

W. Chen, A. Lan, D. Cao, C. Brinton, M. Chiang. Behavioral Analysis at Scale: Learning Course Prerequisite Structures from Learner Clickstreams. *EDM*, 2018.

M. Shridharan, A. Willingham, J. Spencer, T. Yang, C. Brinton. Predictive Learning Analytics for Video-Watching Behavior in MOOCs. *IEEE CISS*, 2018.

C. Bridges, J. Jared, J. Weissmann, A. Montanez-Garay, J. Spencer, C. Brinton. Course Recommendation as Graphical Analysis. *IEEE CISS*, 2018.

N. Slighton, J. Rico, E. Kallfelz, J. Qi, C. Brinton. A Network-Driven Approach to Modeling the Spread of Ebola-type Epidemics. *IEEE CISS*, 2018.

T. Yang, C. Brinton, C. Joe-Wong. Predicting Learner Interactions in Social Learning Networks. *IEEE INFOCOM*, 2018.

A. Lan, C. Brinton, T. Yang, M. Chiang. Behavior-Based Latent Variable Model for Learner Engagement. *International Conference on Educational Data Mining (EDM)*, 2017.

W. Chen, C. Brinton, D. Cao, M. Chiang. Behavior in Social Learning Networks: Early Detection for Online Short-Courses. *IEEE INFOCOM*, 2017.

L. Zheng, C. Joe-Wong, J. Chen, C. Brinton, C. Tan, M. Chiang. Economic Viability of a Virtual ISP. *IEEE INFOCOM*, 2017.

C. Brinton, S. Buccapatnam, F. Wong, M. Chiang, H. V. Poor. Social Learning Networks: Efficiency Optimization in MOOC Forums. *IEEE INFOCOM*, 2016.

L. Zheng, C. Joe-Wong, C. Brinton, C. Tan, S. Ha, M. Chiang. On the Viability of a Cloud Virtual Service Provider. *ACM SIGMETRICS*, 2016.

C. Brinton, M. Chiang. MOOC Performance Prediction via Clickstream Data and Social Learning Networks. *IEEE International Conference on Computer Communications (INFOCOM)*, 2015.

C. Brinton, M. Chiang. Social Learning Networks: A Brief Survey. *48 Annual Conference on Information Science and Systems (CISS)*, 2014.

C. Brinton, E. Aryafar, S. Corda, S. Russo, R. Renoso, M. Chiang. An Intelligent Satellite Multicast and Caching Overlay for CDNs to Improve Performance in Video Applications. *31st AIAA International Communications Satellite Systems Conference (ICSSC)*, 2013.

P. Iannone, K. Reichmann, C. Brinton, et al. Experimental Demonstration of a Cost-Effective Broadcast Overlay for a Commercial WDM PON. *National Fiber Optic Engineers Conference (NFOEC)*, 2011.

P. Iannone, K. Reichmann, C. Brinton, et al. Bi-Directionally Amplified Extended Reach 40Gb/s CWDM-TDM PON with Burst-Mode Upstream Transmission. *Optical Fiber Communication Conference (OFC)*, 2011.

A. Katz, D. Magee, C. Brinton, and J. Qiu. Sensitivity and Mitigation of Reverse IMD in High Power Amplifiers. *2011 IEEE Topical Conference on Power Amplifiers for Wireless and Radio Applications (PAWR)*, 2011.

Submitted Papers

C. Brinton, T. Yang, A. Lan, P. Hansen, R. Bustamante, E. Tenorio, M. Chiang. Joint Prediction of Response Quality and Timing in Online Discussion Forums. *Under review*, Jul 2018.

Patent Applications

C. Brinton, R. Rill, M. Chiang, S. Ha, W. Ju, J. Walker, D. Cao, W. Chen. Systems and Methods for Integrating an eLearning Course Delivery Platform with an Enterprise Social Network. *U.S. Patent #14/876,239.* Filed Oct 2015.

C. Brinton, M. Chiang, S. Ha, W. Ju, R. Rill, J. Walker. Systems and Methods for Authoring an Integrated and Individualized Course or Textbook. *U.S. Patent #14/829,202.* Filed Aug 2015.

C. Brinton, M. Chiang, S. Ha, W. Ju, R. Rill, J. Walker. Systems and Methods to Assist an Instructor of a Course. *U.S. Patent #14/712,108.* Filed May 2015.

M. Chiang, S. Ha, R. Rill, C. Brinton, W. Ju. Methods and Systems for Creating, Delivering, Using, and Leveraging Integrated Teaching and Learning. *U.S. Patent #14/063,289.* Filed Oct. 2013.

Invited Presentations

Talks

"A Lens into AI for Learning." Organizer talk. Data Science for eLearning, Coursera, Mountain View, CA. Mar 2018.

"Technology and Pedagogy: Using Big Data and AI to Enhance eLearning." Invited lecture. DEGREE meeting. Chegg, San Francisco, CA. Dec 2017.

"Learning Analytics and Personalization: A Behavior-Based Approach." Organizer talk. 2017 KDD Workshop on Advancing Education with Data, Halifax, Canada. Aug 2017.

"The Power of Networks: What Facebook, Cell Phones, and Online Courses Have in Common." Engineering Week Keynote Lecture, The College of New Jersey, Ewing, NJ. Feb 2017.

"Beyond Assessment Scores: How Behavior Can Give Insight into Knowledge Transfer." Invited talk. NIPS Workshop on Machine Learning for Education, Barcelona, Spain. Dec 2016.

"The Next Generation of Learning Technologies." Invited talk. Trenton Computer Festival, Ewing, NJ. Mar 2016.

"Pedagogy and Technology: Leveraging Big Data to Enhance the Quality of Human Learning." Invited talk. Bell Labs, Murray Hill, NJ. Nov 2015.

"Improving the Quality of Massively Scaled (Human) Learning Through Machine Learning." Invited Seminar. Department of Computer and Information Sciences, University of Delaware, Newark, DE. May 2015.

"Social Learning Networks: Enhancing the Engagement and Efficacy of Learning." Invited talk. Applied Communication Sciences, Basking Ridge, NJ. Apr 2015.

Panels

"Utilizing Data Science as a Strategy." Panelist. Data Science for eLearning, Udemy, San Francisco, CA. Apr 2017.

"Education Innovation Panel: Pedagogy and Technology." Panelist. Keller Center 10th Anniversary Symposium, Princeton University, Princeton, NJ. Oct 2015.

"Massive Open Online Courses: Reflections, Challenges, and Opportunities." Panelist. 65th Annual United Nations DPI / NGO Conference (Program: Recovering Stolen Childhoods Through Education: Utilizing the Tools of the Digital Age), New York City, NY. Aug 2014.

"Online Courses: Issues and Opportunities." Panelist. The MOOC Experience: Faculty Reflections, William Patterson University, Wayne, NJ. Oct 2013.

"Practical Issues Dealing with Online Courses / Flipped Courses." Panelist. The Role of Technology in Postsecondary Education, Princeton University, Princeton, NJ. May 2013.

Webinars and Podcasts

"Revolutionizing an Industry." Podcast. American Mathematical Society, Mathematical Moments Episode 139, Sept 2018.

"New Perspectives on Improving Business Outcomes through Better Measurement and Online Learning Design." Webinar. Cognizant, Teaneck, NJ. Jun 2018.

"The Power of Networks." Podcast. Smart People Podcast, Episode 268, Apr 2017.

Teaching Experience

ELE/COS 381: Networks: Friends, Money, and Bytes (Princeton, Lecturer) *Fall 2017, Spring 2019*
This course teaches social, economic, and technical networks with data science, optimization, linear algebra, and machine learning. It is interdisciplinary, taken by students in EE, CS, ORFE, economics, and other majors.

- Typical enrollment: 80 students
- Responsibilities: Creating/delivering lectures, mentoring final projects, managing TAs, holding office hours.

ELE 206 / COS 306: Contemporary Logic Design (Princeton, Lecturer) *Fall 2018*
This course teaches the basic concepts in logic design that form the basis of computation and communication circuits, such as logic gates, memory elements, and finite state systems. It is a core class for EE and an elective for COS.

- Enrollment: 105 students
- Responsibilities: Creating/delivering/recording lectures, organizing labs, managing TAs, holding office hours.

ENG 150: Foundations of Engineering (Princeton, Lecturer) *Summer 2018*
This course provides a hands-on introduction to the foundational principles of engineering, including calculus, physics, circuit construction, and computational data analysis. It is for incoming Princeton students prior to freshman year.

- Enrollment: 18 students
- Responsibilities: Creating/delivering lectures, running labs, managing TAs, holding office hours.

ELE 201: Information Signals (Princeton, Lecturer) *Spring 2018*
This course teaches mathematical tools to analyze and manipulate both signals that carry information as well as systems that respond to signals and produce outputs. It is a core class for EE and also taken by COS and math.

- Enrollment: 37 students.
- Responsibilities: Creating/delivering lectures, creating exams, managing TAs, holding office hours.

ENG 342: Advanced Engineering Math II (TCNJ, Adjunct Professor) *Fall 2016, Spring 2017*
This course covers a range of topics in probability/statistics, machine learning, and partial differential equations. It is taken by juniors and seniors in electrical, computer, mechanical, and biomedial engineering.

- Typical enrollment: 30 students.
- Responsibilities: Lecturing, creating/delivering exams and homeworks, grading, holding office hours.

Fog Networks and the Internet of Things (MOOC, Instructor) *Fall 2017 - Present*
This course covers Fog networking, the key trend of pushing computation, storage, and communication tasks from the cloud towards the network edge. In doing so, it discusses the Internet of Things, a key network enabled by Fog.

- Enrollment: 20,000 students since 2015.
- Responsibilities: Creating lecture videos, responding to forum questions, offering virtual office hours.

Networks Illustrated: Principles Without Calculus (MOOC, Instructor) *Summer 2013 - Present*
This Massive Open Online Course (MOOC) explains the fundamental principles behind social, economic, and technical networks. It is based on my textbook *The Power of Networks: Six Principles That Connect our Lives.*

- Enrollment: 150,000 students since 2013.
- Responsibilities: Creating lecture videos, responding to forum questions, making homeworks/exams.

Networks: Friends, Money, and Bytes (MOOC, Instructor) *Fall 2012 - Present*
This is the online version of Networks: Friends, Money, and Bytes. It was among the first six MOOCs by Princeton.

- Enrollment: 250,000 students since 2012.
- Responsibilities: Responding to forum questions, making homeworks/exams, offering virtual office hours.

ELE 381: Networks: Friends, Money, and Bytes (Princeton, lead TA) *Fall 2012*
This is the course I am a lecturer for now. It was the first-ever offering of a STEM course in "flipped classroom" format at Princeton, where lecture videos were watched before class and class time was used for discussion.

- Enrollment: 30 students.
- Responsibilities: Managing Q&A sessions, setting up real-time demonstrations during class, making/grading homeworks/exams, mentoring final course projects.

Mentoring Experience

Masters Thesis
In my postdoctoral work at Princeton, I have advised two students in their masters thesis projects:

Tsung-Yen Yang (Fall 2016 - Present): *Learning Informative and Private Representations via Generative Adversarial Networks*

Jessica Ko (Fall 2015 - Spring 2017): *MOOC User Behavior Analysis: Insight from Topic Analysis and Application to Performance Prediction*

Senior Thesis
Princeton EE requires senior undergraduates to undertake a year of independent study. I have advised five of these:

Mahd Khan (Fall 2018 - Present): *Deep Learning for Improvement of Autonomous Vehicle Navigation*

Caeley Harihara (Summer 2018 - Present): *Data Mining and Feature Engineering of MOOC Clickstreams for Predictive Learning Analytics*

Ankit Buddhiraju (Fall 2014 - Spring 2015): *Dynamic Centrality Measures for Financial Contagion: New Paradigms for Modeling Dynamic Graphs across Disciplines*

George Touloumes (Fall 2013 - Spring 2014): *Visualizing Instructor Feedback for Video-Based Online Courses*

Jian Min Sim (Fall 2012 - Spring 2013): *Investigation of Information Propagation in Social Search*

Junior/Senior Independent Work
Princeton undergraduates are encouraged to perform semester/year-long research. I have mentored roughly 10:

Kevin Wadman (Fall 2018 - Present): *Featurization of Content Passages to Quantify Estimated Time Spent*

Madhumitha Shridharan (Summer 2018 - Present): *Assessing the Efficacy of Deep Learning for MOOC Behavior-based Prediction*

Ankit Buddhiraju (Sept 2013 - May 2014): *Mercury Model: A Unified Approach to Studying Dynamic Networks*

Harvest Zhang (Sept 2012 - May 2013): *Profiling and Visualizing Student Performance in MOOCs*

Rohan Sharma (Sept 2012 - May 2013): *Evaluating Amazon's Ranking Algorithm*

Pranav Ghokale (Sept 2014 - Jan 2015): *TypeAway: Development of a Gesture-Based Typing System*

Vaidhy Murti (Sept 2014 - Jan 2015): *Mod-omate: Automated Moderation on Anonymous Social Media Apps*

Neeta Patel (Sept 2014 - Jan 2015): *Data Analysis of MOOC Video Clickstream Logs*

Ethan Berl (Feb 2013 - May 2013): *Algorithms for Recommending Sequences of Courses for College Students*

Industry Research
In leading the Zoomi Research team, I have directed the work of 7 full-time data scientists/engineers, 4 part-time, and 9 summer interns:

Yuwei Tu (Apr 2018 - Present): Data Scientist

Elizabeth Tenorio (Jan 2018 - Present): Lead Data Scientist

Mike Sperry (Nov 2017 - Present): Lead Data Scientist

Amanda Mason-Singh (Feb 2017 - May 2018): Lead Data Scientist

Joseph Urciuoli (Sept 2016 - Nov 2017): Lead Data Engineer

Weiyu Chen (Jul 2015 - Present): Lead Data Scientist

Da Cao (Mar 2015 - Present): Data Engineer

Priyanka Tomar (Jan - Mar 2018): Contracting Data Analyst

Mark David Scott (Nov 2017 - Jan 2018): Contracting Data Scientist

Scott Haag (Jan - Mar 2016): Contracting Data Scientist

Ali Arab (Mar - Jun 2015): Contracting Data Engineer

Ying Xiong, Patrick Hansen, Richard Junior Bustamante (Jun 2018 - Aug 2018): Undergraduate Interns

Charlton Lu (Jun 2016 - Aug 2016, Jun 2017 - Aug 2017): High School Intern

Advait Chauhan, Derrick Xin, Sean Yun (Jun 2015 - Aug 2015): Undergraduate Interns

Academic Service

Organizer

Workshop on Data Mining for eLearning Personalization. IEEE ICDM, Nov 2018.

Workshop on Advancing Education with Data. ACM SIGKDD, Aug 2017.

TPC Member

IEEE INFOCOM — *2018 - Present*

Peer Reviewer

NIPS — *2018 - Present*

IEEE ICDM — *2018 - Present*

IEEE INFOCOM — *2017 - Present*

ACM SIGKDD — *2017 - Present*

IEEE Transactions on Networking — *2016 - Present*

IEEE Transactions on Learning Technologies — *2014 - Present*

IEEE Transactions on Emerging Topics in Computing — *2015 - Present*

Elsevier Computers & Education — *2015 - Present*

Alumni Interviewer, Princeton University — *2016 - Present*

- Interview undergraduate applicants and submit reports to aid admissions decisions.

Chief Coordinator and Co-Founder, 3 Nights and Done (3ND) — *2012 - 2015*

- 3ND was an open online education platform hosted by Princeton's Edge Lab.

Alumni Mentor, TCNJ School of Engineering — *2012 - Present*

- Mentor ECE undergraduate students in academic and career decisions.

President and Co-Founder, TCNJ Engineering Honor Society (now Tau Beta Pi) *2010 - 2011*

- Helped transform TCNJ EHS into the NJ Zeta Chapter of Tau Beta Pi in 2013.

Vice President, TCNJ IEEE Student Organization *2009 - 2010*

Awards and Honors

INFOCOM Best-in-Session Presentation Award (Apr 2018, Apr 2016): Awarded for having the highest rated presentation in my corresponding sessions at INFOCOM 2016 and 2018.

Bede Liu Best Dissertation Award in Electrical Engineering (May 2016): Awarded to one graduating PhD student in Princeton's EE Department each year.

Yan Huo '94 Graduate Fellowship in Electrical Engineering (Dec 2015): Awarded to three graduate students in Princeton's EE Department each year.

Outstanding Teaching Assistant Award (Sept 2013): Awarded after being an assistant instructor for ELE/COS 381, both at Princeton (in-class) and on Coursera (online).

Princeton University Research Assistantship (Jun 2012 - May 2016): Awarded full tuition and stipend by Princeton for my PhD research.

Princeton University First Year Fellowship (Sept 2011 - May 2012): Awarded full tuition and additional compensation for my first year of graduate studies at Princeton.

TCNJ School of Engineering Banner Bearer (May 2011): Awarded at graduation for obtaining the highest GPA of all graduating engineers from TCNJ in 2011.

Engineer in Training (Sept 2011): Awarded for passing the Fundamentals of Engineering (FE) exam in 2011.

TCNJ Fred O. Armstrong Scholars Award in Electrical Engineering (2008 - 2011): Obtained the highest-in-class GPA of Electrical Engineers. Received each year during my undergraduate studies.

Other Research Positions

Undergraduate Internships

AT&T Labs, Optical Systems Research Group, Middletown, NJ *Jun 2010 - Aug 2010*

Linearizer Technology, RF Research Group, Hamilton, NJ *May 2009 - Dec 2009*

AT&T, Transport Field Technical Support, Bedminster, NJ *Jun 2008 - Aug 2008*

Undergraduate Assistantships

The College of New Jersey, MUSE Research Program, Ewing, NJ *Jun 2009 - Aug 2009*

Affiliations

IEEE

Member *2016 - Present*

Student Member *2008 - 2016*

Member, Tau Beta Pi (NJ Zeta) Engineering Honor Society *2013 - Present*

CV last updated: October 16, 2018