

## Silva Chang

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### EDUCATION

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- M.S., M.Phil. in Computer Science** 1985  
*Yale University, New Haven, CT.*
- B.A. in Mathematics, East Asian Studies** 1982  
*Oberlin College, Oberlin, OH.*

### TEACHING AND ADVISING

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**Teaching Professor, Senior Instructor, Instructor, and Lecturer** 2008 to present  
*Department of Applied Mathematics, University of Colorado, Boulder, CO*

- Taught *Calculus 1A/1B with Algebra, Calculus 1 for Engineers, Calculus 2 for Engineers, Calculus 3 for Statistics and Data Science, A-Game for Calculus, Discrete Applied Mathematics, Discrete Mathematics for Computer Engineers, Python for Mathematical and Statistical Applications*, and *Algorithms and Data Structures in Python*.
- Developed and taught an *Algorithms and Data Structures in Python* course covering asymptotic complexity, basic data structures (including stacks, queues, heaps, and hash tables) and a variety of algorithms (including sorting, graph, divide-and-conquer, and dynamic programming).
- Developed and taught a *Python for Mathematical and Statistical Applications* course with an emphasis on numerical, statistical, and visualization tools such as Matplotlib, Numpy, Pandas, and Jupyter notebooks.
- Developed and taught *Calculus 3 for Statistics and Data Science*, which combines the core topics of multivariable calculus with an introduction to linear algebra.
- Developed a new course called *Computational Tools for Applied Mathematics*, focusing on technical tools used by mathematicians, statisticians, and data scientists, including Excel, SQL, SAS, and Tableau.
- Developed and taught an online summer *Calculus 2 for Engineers* course in 2015 and 2016. Recorded 300+ videos.
- Served as course coordinator. Supervised graduate teaching assistants and undergraduate learning assistants. Created and maintained course websites. Prepared exam problems and solutions.
- Prepared department teaching materials including lecture notes, homework sets, quizzes, supplemental worksheets, review session problems, and grading rubrics.
- Integrated technology into courses, including iPad presentation software, the iClicker response system, Desmos graphing, Mathematica animations, and Gradescope software. Led LaTeX mathematical typesetting workshops for graduate students and faculty.
- Organized a campuswide Calculus Integration Bee in 2013.

**Data Analyst/Assessment Advisor**

2016 to present

*Department of Applied Mathematics, University of Colorado, Boulder, CO*

- For the campuswide Math Summit in July 2022, prepared and presented posters on math placement and APPM calculus students.
- In 2018, designed and implemented a Core Mastery Grading system, currently used in *Precalculus*, *Calculus 1*, and *Calculus 2 for Engineers*. Created dozens of core mastery test questions. Trained and supervised support staff to test 400+ students per week. Set up a report system to record and update student scores.
- For remote learning in 2020–2021, created new online platforms for exam proctoring, math placement tests, and core mastery tests. Provided training to graduate teaching assistants and undergraduate learning assistants on how to lead remote recitations and workgroups. Course enrollment numbers were analyzed and compared to pre-pandemic numbers to estimate the effect of the pandemic on student registration.
- Prepared statistical analyses of student performance in APPM courses. Compared course grades to student SAT/ACT scores, ALEKS scores, high school GPA, attendance, and other factors. Examined the effectiveness of APPM support classes (*APPM Calculus Workgroup*, *A-Game for Calculus*). Created surveys and collected data on student math backgrounds. Examined the correlation between the APPM assessment test and course grades. Analyzed historical grade trends for APPM courses. Tracked the progress of APPM students in upper level math and engineering courses. Calculated engineering retention and graduation rates for students in CU math courses. Administered a self-affirmation study. Examined the performance of transfer students in APPM classes. Identified and advised at-risk students.

**OTHER CAMPUS ACTIVITIES**

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**Math Placement Coordinator**

2016 to present

*University of Colorado, Boulder, CO*

- Directed the math placement process for the CU Boulder campus beginning in fall 2018. Coordinated with the Office of Undergraduate Education, Office of Data Analytics (ODA), Office of Information Technology (OIT), New Student & Family Programs, Buff Info, and the Math Department to generate math placements for all incoming and continuing students. Led the effort to develop and implement a new math placement formula combining high school GPA, SAT/ACT scores, and online placement test scores. Created an online placement test in Canvas LMS and wrote 200+ test questions. Analyzed the correlation between placement results and math course grades. In early 2021, collaborated with ODA to create a revised math placement process for the fall 2021 class, omitting SAT/ACT scores. From 2019 to 2022, met regularly with OIT software developers to guide them in the automation of the math placement process. Fielded inquiries from advisors and students about math placement. Arranged for on-site math placement tests for CU students.

**Concurrent Enrollment Online Strategy Ad Hoc Working Group**

Spring and Fall 2023

*University of Colorado, Boulder, CO*

- Member of the CU Boulder College of Arts and Sciences working group which met throughout the year to strategize ways to engage high school students through online courses and programs.

**College of Engineering Math Committee**

Fall 2023 to present

*University of Colorado, Boulder, CO*

- Member of the CEAS Math Committee, which will discuss CU Boulder math courses.

**Nationwide Math Discussion**

Fall 2023 to present

*Association of Chief Admission Officers of Public Universities*

- Represented CU Boulder in the ACAOPU Nationwide Math Discussion about the math readiness of incoming students.

## OUTREACH ACTIVITIES

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### Founder and Co-Director

2005 to present

*Colorado Math Circle, Boulder, CO*

- The Colorado Math Circle hosts guest lectures and problem solving sessions at CU Boulder throughout the year for talented high school and middle school students, attracting students from around the state. Alumni have received national honors including the National Science Foundation Graduate Research Fellowship, Frank and Brennie Morgan Prize (for outstanding undergraduate research in mathematics), Alice T. Schafer Prize (for excellence in math by an undergraduate woman), William Lowell Putnam Competition fellow, Barry M. Goldwater Scholarship, and Rhodes Scholarship.
- Co-Coach of the 30+ member Colorado ARML Team which represents the state at the American Regions Mathematics League national competition annually.
- Supervisor and instructor for weekly extracurricular math sessions for high school and middle school students.
- Developed and taught weeklong intensive summer programs, including the Sophie Math Workshops for girls and the Lambda Workshop for computer programming.
- Recipient of grants from the CU Boulder Outreach Committee, Mathematical Association of America Rocky Mountain Section, and Mathematical Sciences Research Institute (MSRI).

### Co-Editor-in-Chief and Editorial Board Member

2016 to present

*MAA American Mathematics Competitions (AMC)*

- Oversee the creation of the AMC 8 national math competition, sponsored by the Mathematical Association of America, which attracts 75,000 middle school participants annually. Direct a 25-member editorial board composed of professors and other educators from around the country.
- Member of the AMC 10/12 editorial board.

### Board Member

2022 to present

### Faculty Member

2009–2014, 2016–2017

*MathPath*

- Member of the Board of Directors for MathPath, a residential summer program for middle school students showing high promise and interest in mathematics.
- Taught weeklong intensive math and computer programming courses to middle school students.

### Other Volunteer Outreach Activities

- Volunteer for the MATHCOUNTS Competition, 2011 to present. Scoring Coordinator for the Boulder Chapter and Colorado Competitions.
- Member of the Colorado Mathematics Awards Steering Committee, 2007 to 2022.
- Advisor for the Fairview High School Math Club, 2005–2011.
- Coach of the Summit Middle School MATHCOUNTS Team, 2005–2010.

## OTHER WORK EXPERIENCE

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**Website Developer** 2004–2007  
*Boulder, CO*

- Designed and created websites for schools and other organizations.

**Business Operations Manager** 2003–2004  
*The Tea Spot, Boulder, CO*

- Managed the financial operations of a retail tea shop.

**Software Engineer** 2002–2003  
*Massively Parallel Technologies, Louisville, CO*

- Developed parallel processing programs for object recognition, linear equation solvers, and other applications.

**Senior Programmer** 1986–1988  
*Scientific Computing Associates, New Haven, CT*

- Collaborated with Yale University professors to design and implement *CLAM*, a programming environment for scientific computation.

## Honors and Awards

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Winner of the *Samuel L. Greitzer Distinguished Coach Award*, American Regions Mathematics League (ARML), for outstanding service to a regional team 2022

Winner of the *CU Boulder Faculty Assembly Award* for Excellence in Leadership and Service 2020

Nominated for the CU Boulder *Marinus Smith Award* to recognize faculty and staff members who have had a positive impact on students 2019

Recipient of the National Society of Professional Engineers Colorado (NSPE-CO) *Educator of the Year Award* 2014

Nominated for the CU Boulder *ASSETT Award for Outstanding Teacher for Technology in Teaching* 2013

Nominated for the CU Boulder *John and Mercedes Peebles Innovation in Education Award* 2010

## Presentations

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*Tips for Finding an Internship or Job*, Department of Applied Math, University of Colorado, Boulder, October 2023.

*Math Club Talk*, Colorado School of Mines, Golden, CO, April 2023.

*Math Summit*, University of Colorado, Boulder, July 2022.

*Mastery-Based Grading in APPM 1350 Calculus 1 Fall 2020*, University of Colorado Engineering Council, Boulder, CO, September 2021.

*Math Club Talk*, Grandview High School, remote, November 2020.

*Mastery-Based Grading in a Large Calculus Course* with Anne Dougherty, Joint Mathematics Meetings, Denver, CO, January 2020.

*Core Mastery Grading in APPM 1350 Calculus 1 Fall 2018* with Anne Dougherty, 11th Annual Symposium on STEM Education Poster Session, University of Colorado, Boulder, September 2019.

*Technology in the STEM Classroom*, Graduate Teacher Program (GTP) Workshop, University of Colorado, Boulder, August 2019.

*APPM Calculus Courses the past five years* with Anne Dougherty, Discipline-Based STEM Education Research (DBER) Seminar, University of Colorado, Boulder, April 2019.

*Math Placement Results Fall 2018*, presented to Office of Undergraduate Education, College of Arts and Sciences, College of Engineering, and Department of Mathematics, February 2019.

*Core Mastery Grading in APPM 1350 Calculus I*, University of Colorado Engineering Council, Boulder, CO, January 2019.

*Core Mastery Grading in APPM 1350 Calculus I*, Discipline-Based STEM Education Research (DBER) Seminar, University of Colorado, Boulder, November 2018.

*Technology in the STEM Classroom*, Graduate Teacher Program (GTP) Workshop, University of Colorado, Boulder, August 2018.

*How do APPM students perform in subsequent engineering courses?*, Applied Math Engineering Partnership Committee, University of Colorado, Boulder, July 2017.

*Improving the Applied Math Assessment Exam Through Item Analysis* with Anne Dougherty, 7th Annual Symposium on STEM Education Poster Session, University of Colorado, Boulder, September 2015.

*Placement and Assessment are Key* with Anne Dougherty, 6th Annual Symposium on STEM Education Poster Session, University of Colorado, Boulder, September 2014.

*Mathematical Origami*, Pikes Peak Teachers Math Circle, University of Colorado, Colorado Springs, CO, September 2011.

*Mathematical Origami*, Circle on the Road Workshop, Mathematical Sciences Research Institute (MSRI), Houston, TX, March 2011.

*Colorado Math Circle: The First Five Years*, Mathematical Association of America, Rocky Mountain Section Meeting, Boulder, CO, February 2011.

*Sophie Math: A Math Circle Program for Girls*, Joint Mathematics Meetings, New Orleans, LA, January 2011.

## **Publications**

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Chang, S., *My Path to Math: A Math Team Made the Difference*, *MAA Math Values*, September 2021.

Chang, S., Abrams, G., White, D., and Craviotto, C. *Math Circles Flourish throughout the Front Range*, *The Colorado Mathematics Teacher*, Spring 2012.

Gelernter, D., Carriero, N., Chandran, S., and Chang, S. *Parallel programming in Linda*. *International Conference on Parallel Processing*, August 1985, 255-263.

## **Professional Memberships**

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Mathematical Association of America (MAA)

2009 to present