

DAVID I SHUMAN

Olin College of Engineering ♦ 1000 Olin Way ♦ Needham, MA 02492 ♦ Phone: 781-292-2558 ♦ E-mail: dshuman@olin.edu

EDUCATION

- 2004 – 2010 **University of Michigan** *Ann Arbor, MI*
Ph.D., Electrical Engineering: Systems (April 2010)
M.S., Applied Mathematics (May 2009)
M.S., Electrical Engineering: Systems (May 2006)
• GPA: 4.14/4.00
• Major: Communications; Minor: Control
• Thesis advisor: Prof. Mingyan Liu
• Thesis title: “From sleeping to stockpiling: Energy conservation via stochastic scheduling in wireless networks”
- 1997 – 2001 **Stanford University** *Stanford, CA*
M.S., Engineering-Economic Systems & Operations Research
B.A., Economics, with a Minor in Computer Science
• GPA: 3.88/4.00 (M.S.); 3.74/4.00 (B.A.)
• Elected to Phi Beta Kappa
• Studied abroad at Oxford University, England, Spring 2000
• Master’s project: “Dynamic allocation of R&D funding across a portfolio of electricity generation technologies while facing uncertain technical success,” in conjunction with the Electric Power Research Institute (EPRI)
- 1993 – 1997 **Phillips Academy** *Andover, MA*
• Elected to Cum Laude Society

SUMMARY OF ACADEMIC INTERESTS

- Research Interests: • **Signal processing on graphs**, including ranked choice voting, multiscale transforms, computational harmonic analysis, sparse approximation theory, dictionary learning, and polynomial approximations for fast, distributed processing
- Teaching Interests: • **Stochastic control**, including resource allocation and stochastic scheduling problems, energy-efficient design of wireless communication networks, inventory theory, and approximate dynamic programming
- Teaching Interests: • Data science, signal processing, linear algebra, computational linear algebra, probability and stochastic processes
statistical modeling, machine learning, optimization, network science, spectral graph theory, and sustainability
- Leadership & Admin Interests: • Strategic planning, innovative models for higher education finance, student belongingness, college as a living laboratory models, external partnerships, data-informed decision-making, collaborative curricular design

ACADEMIC POSITIONS

- 2022 – Current **Professor**, Data Science and Applied Mathematics, Franklin W. Olin College of Engineering *Needham, MA*
- 2019 – 2022 **Associate Professor**, Department of Mathematics, Statistics, and Computer Science, Macalester College *St. Paul, MN*
• Data Science Coordinator, 2015 – 2022
• Math Coordinator, 2021 – 2022
- 2014 – 2018 **Assistant Professor**, Department of Mathematics, Statistics, and Computer Science, Macalester College *St. Paul, MN*
- 2010 – 2013 **Postdoctoral Researcher**, Ecole Polytechnique Fédérale de Lausanne (EPFL) *Lausanne, Switzerland*
• Advisors: Prof. Pierre Vandergheynst and Prof. Pascal Frossard
• Researched new techniques for processing data on graphs, including multiscale analysis methods and efficient distributed optimization techniques
• Applications included data analysis for social and transportation networks, distributed signal processing in sensor and camera networks, image processing, statistical learning problems, and analysis of astrophysical data
- 2006 – 2010 **Graduate Student Research Assistant**, University of Michigan *Ann Arbor, MI*
• Conducted research on stochastic scheduling, estimation, and resource allocation problems in communications networks
• Applications included wireless multimedia streaming, duty cycling and clock calibration of wireless sensor networks, and soil moisture smart sensor webs

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TEACHING EXPERIENCE

- 2022 – Current **Instructor and Co-Instructor**, Franklin W. Olin College of Engineering *Needham, MA*
- ENGX 2000 – Quantitative Engineering Analysis 1 (Fall 2022, Fall 2023, Fall 2024, Fall 2025)
 - ENGX 2005 – Quantitative Engineering Analysis 2 (Spring 2023)
 - MTH 2130 – Probability and Statistics: Probabilistic Modeling (Fall 2022, Fall 2025)
 - ENGR 3531 / MTH 2131 – Data Science With an Eye Towards Sustainability (Spring 2024, Spring 2026)
 - ENGR 3199 – College as a Living Lab: Building Energy & Operations Optimization (Fall 2024, Spring 2025)
 - ENGR 3415 – Digital Signal Processing (Spring 2025)
 - Independent Study and Research Instructor (1-2 students per semester)
- 2014 – 2022 **Instructor**, Macalester College *St. Paul, MN*
- STAT/COMP 112 – Introduction to Data Science (Fall 2018, Fall 2021)
 - STAT 155 – Introduction to Statistical Modeling (Spring 2014, Spring 2019, Spring 2021)
 - MATH 236 – Linear Algebra (Fall 2014, Fall 2015, Fall 2016)
 - MATH 254 – Probability and Mathematical Statistics (Fall 2015, Spring 2016)
 - MATH/STAT 354 – Probability (Fall 2019, Fall 2020, Spring 2021)
 - MATH/STAT/COMP 365 – Computational Linear Algebra (Spring 2014, Spring 2015, Spring 2016, Spring 2017, Spring 2022)
 - MATH 437 – Signal Processing (Fall 2014, Fall 2016, Fall 2018, Fall 2021)
 - MATH 494 – Projects in Data Science (Fall 2017)
- 2018 – 2021 **Instructor**, Data Science and Statistics Boot Camps *Minneapolis, MN and Wayzata, MN*
- Taught three to five day workshops to build the statistical, data, and computing literacy of mathematics Ph.D. students attending the Math-to-Industry Boot Camp at the Institute for Math and its Applications (IMA) at the University of Minnesota (June 2019, June 2020, June 2021)
 - Taught a four-day data science workshop for approximately 30 employees of Cargill (October 2018)
- Fall 2011 and Fall 2012 **Co-Instructor**, Ecole Polytechnique Fédérale de Lausanne (EPFL) *Lausanne, Switzerland*
- EE-204 – Circuits and Systems I (with Prof. Volkan Cevher)
 - Prepared and gave some lectures to 125-150 students, led recitation and MATLAB sessions, revamped the syllabus, chose the homework problems, wrote the exams, and managed a team of six teaching assistants
- 2010 – 2013 **Informal Instructor**, Signal Processing Laboratories, EPFL *Lausanne, Switzerland*
- Taught selected topics in convex optimization and spectral graph theory in weekly lab meetings
- Fall 2007 **Graduate Student Instructor**, University of Michigan *Ann Arbor, MI*
- EECS 401 – Probabilistic Methods in Engineering
- Summer 1999 **Teaching Assistant**, Labor Economics class, Stanford Sophomore College *Stanford, CA*
- 1995 – 1999 **Volunteer Tutor** in English, Algebra, and Calculus *Andover, MA; Lawrence, MA; and East Palo Alto, CA*

STUDENT ADVISING AND MENTORING EXPERIENCE

- 2022 – Current **Supervisor**, Undergraduate Research Group on Signal Processing on Graphs, Franklin W. Olin College of Engineering *Needham, MA*
- Work closely with four to six Olin undergraduate research students on a weekly basis during academic year and a daily basis during the summer, teaching them about signal processing and graph theory, developing their abilities to read journal articles and conduct numerical experiments, and providing feedback on their communication
- 2022 – Current **Academic Advisor**, Franklin W. Olin College of Engineering *Needham, MA*
- Official academic advisor for 10-15 students each year, and informal advisor to others
- 2022 – 2024 **Undergraduate Research Mentor**, Franklin W. Olin College of Engineering *Needham, MA*
- Mentored undergraduate Phillip Post on research work now published in, “Quantifying the effect of striking with picketing on grocery store foot traffic,” *EPJ Data Science*, vol. 13, art. num. 59, September 2024
- 2022 – 2024 **Capstone Advisor**, Franklin W. Olin College of Engineering *Needham, MA*
- Subject matter expert for student team developing an open, interactive roadway high injury network map to better understand equity and other contextual factors
 - Subject matter expert for student team developing environmental, social, and governance (ESG) investing metrics

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STUDENT ADVISING AND MENTORING EXPERIENCE (cont.)

2023	BOW DataFest Organizer and Mentor , Franklin W. Olin College of Engineering <ul style="list-style-type: none">Initiated and coordinated Babson, Olin, and Wellesley College (BOW) participation in this weekend-long, national undergraduate data science competition, in which over 70 BOW students participated	<i>Needham, MA</i>
2023	Doctoral Thesis Committee Member <ul style="list-style-type: none">Elie Chedemail, ENSAI École Nationale de Statistique et Analyse de l'Information, Cesson-Sévigné, France	
Summer 2020, Summer 2019, Summer 2018, Summer 2017, Summer 2015	Supervisor , Undergraduate Research Group on Signal Processing on Graphs, Macalester College <ul style="list-style-type: none">Led diverse research groups of up to four Macalester students that included at least half women and at least half international students, from countries including Jamaica and ChinaWorked closely with the students on a daily basis, teaching them about signal processing and graph theory, developing their abilities to read journal articles, encouraging them to use numerical experimentation to investigate new mathematical ideas, and providing feedback on their oral and written communicationRan the ten week programs like an REU, with students giving formal presentations, presenting at a poster session, writing a final technical report, and incorporating their code into an open access toolboxStudents presented their findings at research conferences and workshops<ul style="list-style-type: none">“Signal processing on the permutahedron: New analysis tools for ranked choice data,” Ellen Chen and Jennifer DeJong, poster presentation at the 2019 Midstates Consortium for Math and Science Undergraduate Research Symposium“Spectrum-adapted polynomial approximation for matrix functions,” Tiffany Fan, poster presentation at the 2019 Joint Mathematics Meetings (Outstanding Poster Award Winner), and oral presentation at the 2019 Graph Signal Processing Workshop“An M-channel critically sampled filter bank for graph signals,” Yan Jin, oral presentation at the 2017 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)“Graph reduction methods for multiscale dictionary designs,” Andre Archer, Stefan Faridani, Yan Jin and Elle Weeks, poster presentation at the 2016 Joint Mathematics MeetingsPublished two conference papers and three journal articles with Macalester undergraduates (see below for details)	<i>St. Paul, MN</i>
2014 – 2022	Academic Advisor , Mathematics, Statistics, and Computer Science, Macalester College <ul style="list-style-type: none">Official academic advisor for 8-10 students at a time, and informal advisor and mentor to numerous others	<i>St. Paul, MN</i>
2015 – 2021	Undergraduate Honors Thesis Advisor , Macalester College <ul style="list-style-type: none">Yilin (Ellen) Chen, Mathematics, 2021 (co-advisor), now a Ph.D. student at University of Chicago, Computational and Applied MathematicsTiffany Fan, Mathematics, 2019, now a Ph.D. student at Stanford University, Institute for Computational & Mathematical EngineeringShuni Li, Mathematics, 2018, now a Ph.D. student at University of California, Berkeley, StatisticsZhaoqi Li, Mathematics, 2018 (co-advisor), now a Ph.D. student at University of Washington, StatisticsYan Jin, Mathematics, 2016, now a Ph.D. student at M.I.T., Institute for Data, Systems, and Society	<i>St. Paul, MN</i>
2016 – 2022	Undergraduate Honors Thesis Committee Member , Macalester College <ul style="list-style-type: none">Daniel Chechelnitsky, Computer Science, 2022Matt Zhang, Economics, 2021Tayeb Zaidi, Physics, 2017Cory Stern, Economics, 2016Sophors Khut, Mathematics, 2014Ruby Byrne, Physics, 2014	<i>St. Paul, MN</i>
2016 – 2022	Capstone Advisor , Mathematics, Statistics, and Computer Science, Macalester College	<i>St. Paul, MN</i>
2016 – 2022	Data Science for Social Good (DS4Good) Club Advisor , Macalester College <ul style="list-style-type: none">Initiated and advised this student organization, which worked closely with Twin Cities non-profit organizations on data science projects	<i>St. Paul, MN</i>
2016 – 2022	DataFest Organizer and Mentor , Macalester College <ul style="list-style-type: none">Initiated and coordinated Macalester’s participation in this weekend-long, national undergraduate data science competition, in which 50-75 Macalester students participated each year	<i>St. Paul, MN</i>
2016 – 2022	Pre-Engineering Advisor , Macalester College	<i>St. Paul, MN</i>

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STUDENT ADVISING AND MENTORING EXPERIENCE (cont.)

- 2014 – 2022 **Ad Hoc Mentor**, student organizations such as Women in MSCS and Macalester Consulting Group, Macalester College *St. Paul, MN*
- Presented insights on my consulting and financial services experience, as well as job searching tips
 - Helped Women in MSCS organize a workshop on salary negotiation and the pay gap
- 2010 – 2013 **Master’s Thesis Co-Supervisor and Mentor**, Signal Processing Laboratories, EPFL *Lausanne, Switzerland*
- Co-supervised the master’s theses of Mohammadjavad Faraji and Nathanael Perraudin

HIGHER ED STRATEGIC PLANNING AND FINANCE EXPERIENCE

- 2024 – Current **Co-Leader of the Sustainability Changemakers Team of Olin’s College as a Living Laboratory (CaLL) Initiative**, Franklin W. Olin College of Engineering
- This strategic initiative aims to position Olin as an experimental testbed for reinvention and sustainability; adapt the curriculum to provide meaningful impact-centered learning experiences that further enable the development of engineers' identities as sustainability practitioners and changemakers; promote sustainability culture and practices; move the campus towards net-zero emissions; establish new partnerships; and provide budget relief
 - With my co-lead, Claire Rodgers, assembled and currently lead a cross-disciplinary team of 13 staff, faculty, and students
 - Serve in a project management role, updating the scope, connecting the work of different sub-teams, and reporting progress to Olin leadership, the Board of Trustees, and broader groups of alumni, students, staff, and faculty
 - Led a research effort with three undergraduate students on living lab models and examples, and leveraged our research to formally define the vision for CaLL and articulate Olin’s strengths and distinctive features in this work
 - Collaborate closely with facilities and operations teams as we redesign the campus as a model of a carbon neutral working, living, and learning community
 - Identify opportunities to integrate campus operations into curricular and co-curricular learning
 - Establish external partnerships and secure funding support for these strategic initiatives
 - With three colleagues, developed and co-taught a year-long impact-centered course with student projects that combine data science, thermodynamics, machine learning, and collaborative design skills to improve Olin’s building automation and HVAC systems, and reduce Olin’s energy consumption
- 2024 – Current **Steering Committee Member for the Olin Circle of Advocates**, Franklin W. Olin College of Engineering
- Co-convened a group of students, staff, faculty, alumni, and friends of Olin to use a strategic doing framework to explore the creation of a new sustainability-centered community, co-working, and project space at Olin that would facilitate mentorship, nurture innovation, and enable communities to wrestle with the complicated intersections between technology, climate change, and systems of power
- 2025 – Current **Elected Faculty Representative, Committee on Communication & Trust**, Franklin W. Olin College of Engineering
- Serve on an ad hoc committee comprised of two elected members from each of students, staff, faculty, alumni, and Board of Trustees to discuss communication and accountability mechanisms at Olin, in an effort to improve trust
- 2023 **Co-Organizer of Faculty Retreat on Strategic Communication**, Franklin W. Olin College of Engineering
- Co-designed faculty workshop to catalog our work around impact themes that can guide external communication and fundraising efforts
- 2023 **Enrollment Data Analyst**, Franklin W. Olin College of Engineering
- Cleaned and analyzed 10 years of course enrollment data to understand trends and make recommendations to the Provost about potential changes in the faculty teaching load
- 2020 – 2022 **Elected Member of the Strategic Planning and Analysis Committee**, Macalester College
- Primary author of the [Macalester Financial Model Overview document](#)
 - Co-led numerous sessions to educate Macalester students, staff, and faculty about the College’s finances and connections to strategy, in preparation for the 2021-2022 strategic planning process
- 2021 – 2022 **Member of the Task Force on the Budget**, Macalester College
- 2021 – 2022 **Faculty Representative to the Board of Trustees’ Finance Committee**, Macalester College
- 2021 – 2022 **Member of the Presidential Task Force on Student Employment**, Macalester College
- 2020 – 2021 **Faculty Representative to the Board of Trustees’ Advancement Committee**, Macalester College
- 2020 – 2021 **Member of the COVID-19 Surveillance Testing Design Team**, Macalester College

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ACADEMIC LEADERSHIP AND CURRICULAR DESIGN EXPERIENCE

- 2025 **Co-Leader of “Sustainability Across the Curriculum” Workshop**, Franklin W. Olin College of Engineering
- 2024 – 2025 **Project-Based Learning Mentor**, Franklin W. Olin College of Engineering
- Coached a faculty cohort from Benjamin Franklin Cummings Institute of Technology
- 2022 – 2023 **Member of First Year Coordination Committee**, Franklin W. Olin College of Engineering
- Met weekly to coordinate assignments across classes, identify and provide support for students who are struggling, and discuss broader first year curricular issues
- 2015 – 2022 **Data Science Coordinator**, Macalester College
- Co-developed a new Introduction to Data Science course with three statistics and computer science colleagues, and developed a new Projects in Data Science course
 - Played a leading role in curriculum revisions that resulted in a new Minor in Data Science (2015), a new Major in Data Science (2021), and a new Major in Statistics (2021)
 - Initiated and organized weekend-long DataFest competition each year
 - Initiated and supported the Data Science for Good (DS4Good) student organization by connecting student leaders to partner organizations in the Twin Cities
 - Approved all student data science minor plans (over 100 since the program was introduced); advised students on data science graduate school programs; and connected students to employers hiring data scientists
 - Co-led introductory data science training workshops for Macalester faculty to foster new collaborations across departments and divisions and generate broader participation in the data science program
 - Participated in the AALAC Big Data Workshop (Jan. 2016) and the AALAC Workshop on Data Science in the Liberal Arts (Spring 2021), both focused on data science curriculum development
- 2021 – 2022 **Math Coordinator**, Macalester College
- One of two area coordinators who worked closely with the Chair to lead the department
 - Served as the point person for visiting faculty; managed the hiring of new visiting faculty; planned the course schedule; organized and led monthly meetings for math faculty; and approved students’ major and minor plans
- 2022 **External Department Reviewer**, Computer Science and Data Science programs
- 2019 – 2020 **Participant in the Academic Leadership Seminar**, Macalester College
- 2016 – 2017 **Co-Organizer of Department Seminar Series**, Mathematics, Statistics and Computer Science, Macalester College
- 2014 – 2017 **Library Liaison**, Mathematics, Statistics and Computer Science, Macalester College
- Undertook a comprehensive review of the data science literature, and updated the library’s collection accordingly

PERSONNEL EXPERIENCE

- 2023 – Current **Interviewer**, Franklin W. Olin College of Engineering
- Interview all faculty candidates and some staff candidates (e.g. institutional research, campus operations)
- 2024 **Reappointment and Promotion Committee Member**, Franklin W. Olin College of Engineering
- Reviewed the reappointment files of four faculty members and provided reappointment recommendations
- 2024 **Resident Resource (R2) Selection Committee Member**, Franklin W. Olin College of Engineering
- Reviewed applications and selected students to be resident assistants in the dormitories
- 2019 – 2022 **Candidate Review Committee Member**, Macalester College
- Reviewed the reappointment and promotion files of six different faculty members as part of pre-tenure, tenure, and non-tenure track review processes, and provided reappointment, promotion, and tenure recommendations
- 2015 – 2019 **Faculty Search Committee Member**, Macalester College
- Statistics, 2019 (hired Kelsey Grinde)
 - Mathematics, 2018-2019 (hired Taryn Flock)
 - Applied Mathematics, 2018-2019 (hired Will Mitchell)
 - Statistics, 2017-2018 (hired Brianna Heggeseeth and Leslie Myint)
 - Statistics, 2016-2017 (no hire)
 - Computer Science, 2015-2016 (hired Bret Jackson)

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DIVERSITY, EQUITY, INCLUSION, AND BELONGINGNESS PRACTICE

- 2022 – 2025 **DEI Champion**, Franklin W. Olin College of Engineering
- Integrated longitudinal student data (e.g., alumni and BCSSE/NSSE surveys) to perform a quantitative study of racial equity in Olin students’ sense of belongingness, participation in high impact practices, academic success, and post-graduation outcomes
 - Conducted and shared out a qualitative follow-up study by interviewing 12 Black and Latinx alumni to gain a more holistic understanding of lived student experiences at Olin, and to surface systemic barriers to thriving
 - Participated in workshops and trainings from the Racial Equity and Justice Institute at Bridgewater State University
- 2025 **Co-Leader of “Taking Action to Make Olin More Inclusive” Workshop**, Franklin W. Olin College of Engineering
- 2023 – 2024 **Co-Organizer of STEM Slam** (HBCU homecoming meets technology fair), The Foundry, Cambridge, MA
- 2020 – 2021 **Co-Author of the Biennial Faculty Salary Audit**, Macalester College
- Sep. 2018 **Participant**, Faculty Career Enhancement Conference: Collaboration to Address 21st Century Challenges in Liberal Education through Inclusive Communities of Practice, Associated Colleges of the Midwest, Rosemont, IL
- Fall 2016 **Participant in the Faculty Learning Community on Advising and Inclusivity**, Macalester College

UNDERGRADUATE ADMISSION AND FINANCIAL AID EXPERIENCE

- 2022 – Current **Member of the Admission Committee**, Franklin W. Olin College of Engineering
- Read and evaluate 40-60 applicant files each year; participate in admission committee sessions
- 2024 – Current **Admission Interviewer at Candidates’ Weekends**, Franklin W. Olin College of Engineering
- Conduct individual and group interviews of prospective students
- 2023 **Member of Committee to Analyze Potential Changes to Tuition Model**, Franklin W. Olin College of Engineering

SERVICE TO THE PROFESSION

- 2023 **Panel Reviewer**, National Science Foundation, Computer and Information Science and Engineering (CISE)
- 2021 – 2025 **Associate Editor**, IEEE Transactions on Signal Processing
- Manage the peer review process for approximately 25-35 manuscripts per year
- 2019 – 2022 **Associate Editor**, IEEE Transactions on Signal and Information Processing over Networks
- Managed the peer review process for approximately 10-15 manuscripts per year
- 2017 – 2019 **Associate Editor**, IEEE Signal Processing Letters
- Managed the peer review process for approximately 30-40 manuscripts per year
- 2019 **Technical Chair and Co-Organizer**, 2019 Graph Signal Processing Workshop
- 2015 – 2018 **Technical Program Committee Member**, IEEE Global Conference on Signal and Information Processing
- 2015 **Co-Organizer**, panel on “Preparing a Successful Grant Application” at the 2015 Joint Mathematics Meetings
- 2012 – 2014 **Co-Organizer and Co-Editor**, special session on “Localization, Diversity, and Uncertainty in Signal Representations” at the 2012 European Signal Processing Conference and June 2014 special issue of Advances in Computational Mathematics on the same subject
- 2011 **Organizer**, three-day workshop for the European project UNLocX (uncertainty principles versus localization properties), which was attended by team members from six universities and multiple companies
- 2007 – Current **Reviewer for journals** such as Applied and Computational Harmonic Analysis, IEEE Transactions on Signal Processing, IEEE Transactions on Signal and Information Processing over Networks, IEEE Signal Processing Magazine, IEEE Journal of Selected Topic in Signal Processing, IEEE Signal Processing Letters, IEEE Transactions on Information Theory, Journal of Fourier Analysis and Applications, Proceedings of the IEEE, IEEE/ACM Transactions on Networking, IEEE Communications Letters, IEEE Transactions on Communications, IEEE Transactions on Mobile Computing, and IEEE Transactions on Vehicular Technology

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SERVICE TO THE PROFESSION (cont.)

2007 – Current **Reviewer for conferences** such as the IEEE Global Conference on Signal and Information Processing, the IEEE International Conference on Acoustics, Speech and Signal Processing, the Graph Signal Processing Workshop, the Conference on Neural Information Processing Systems, the European Signal Processing Conference, the IEEE Statistical Signal Processing Workshop, the IEEE International Conference on Communications, and the IEEE International Symposium on Information Theory

AWARDS, FELLOWSHIPS, AND GRANTS

2025 **Recipient and Team Lead**, American Society for Engineering Education Engineering for One Planet Mini-Grant (approx. \$8000) and Cohort IV Program, which includes a community of practice centered on integrating sustainability into curricula

2023 **Recipient**, the 2023 IEEE Signal Processing Society Best Paper Award, which honors “a paper of exceptional merit,” for the 2018 paper “Distributed signal processing via Chebyshev polynomial approximation”

2023 **Recipient**, the 2023 IEEE Signal Processing Society Outstanding Editorial Board Member Award, honoring “outstanding editorial board service for the IEEE Transactions on Signal and Information Processing Over Networks”

2023 **Elevated to Senior Member of the IEEE**, in honor of “having made significant contributions to the profession”

2016 **Recipient**, the 2016 IEEE Signal Processing Magazine Best Paper Award, which honors “an article of exceptional merit and broad interest,” for the 2013 paper “Signal processing on graphs: Extending high-dimensional data analysis to networks and other irregular domains”

2014 – 2015 **Fellow**, Project NEXT (New Experiences in Teaching), Mathematical Association of America. Project NEXT is a professional development program to improve young faculty’s teaching, research, and service skills in undergraduate mathematics

2010 **Co-Author**, grant application for a project on signal processing on graphs that was awarded CHF 161,135 (approx. \$190,000) by the Swiss National Science Foundation

2010 **Recipient**, the Distinguished Achievement Award from the University of Michigan College of Engineering, awarded annually to one student in each department based on research, leadership, and academic performance

2000 – 2001 **Semifinalist**, Stanford Entrepreneur’s Challenge business plan competition

CORPORATE WORK EXPERIENCE

2001 – 2004 **Senior Analyst**, Monitor Group *New York, NY; London, England; and Cambridge, MA*
(Intern in 2000) Worked for the investment banking division of a global strategy consulting firm

- Structured and developed valuation models and financial analyses
- Researched in-depth company information, industry trends, and emerging technologies
- Designed and analyzed strategic options available to client companies
- Interacted with senior clients (e.g. CEO, CFO, Head of Strategy), lawyers, and financial advisors

Sample mergers and acquisitions advisory and strategy consulting projects:

- Advised a blue-chip private equity firm on a ~\$100m acquisition of a European telecommunication services business
- Helped a leading global consumer electronics company develop the structure, scope, and business plan for a new interactive television entity
- Advised a fiber-optics technology company on acquisition and licensing opportunities in the aerospace sector

Summer 1999 **Information Technology Intern**, Federal Home Loan Bank *Boston, MA*

- Configured and installed new computers; maintained user support line

Summer 1997 **Network Engineer Intern**, Raytheon Corporation *Sudbury, MA*

- Collaborated with a team of 14 engineers on an overhaul of the network infrastructure

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SOFTWARE

- GSPBox:
- MATLAB and Python graph signal processing toolbox available at <https://epfl-lts2.github.io/gspbox-html/>
 - N. Perraudin, J. Paratte, D. Shuman, L. Martin, V. Kalofolias, P. Vandergheynst, and D. K. Hammond, "GSPBOX: A toolbox for signal processing on graphs," *arXiv e-print*, August 2014.
- UnLocBoX:
- MATLAB convex optimization toolbox available at <https://epfl-lts2.github.io/unlocbox-html/>
 - N. Perraudin, D. Shuman, G. Puy, and P. Vandergheynst, "UNLocBoX: A MATLAB convex optimization toolbox for proximal splitting methods," *arXiv e-print*, December 2016.

PUBLICATIONS AND PRESENTATIONS

- Journal Papers:
- E. Isufi, F. Gama, D. I Shuman, and S. Segarra, "Graph filters for signal processing and machine learning on graphs," *IEEE Transactions on Signal Processing*, vol. 72, pp. 4745-4781, January 2024.
 - G. Leus, A. G. Marques, J. M. F. Moura, A. Ortega, and D. I Shuman, "Graph signal processing: History, development, impact, and outlook," *IEEE Signal Processing Magazine*, vol. 40, no. 4, pp. 49-60, June 2023.
 - Y. Chen*, J. DeJong*, T. Halverson, and D. I Shuman, "Signal processing on the permutahedron: Tight spectral frames for ranked data analysis," *Journal of Fourier Analysis and Applications*, vol. 27, art. 70, August 2021.
 - D. I Shuman, "Localized spectral graph filter frames: A unifying framework, survey of design considerations, and numerical comparison," *IEEE Signal Processing Magazine*, vol. 37, no. 6, pp. 43-63, November 2020.
 - T. Fan*, D. I Shuman, S. Ubaru, and Y. Saad, "Spectrum-adapted polynomial approximation for matrix functions with applications in graph signal processing," *Algorithms*, vol. 13, no. 11, 295, pp. 1-22, November 2020.
 - S. Li*, Y. Jin*, and D. I Shuman, "Scalable M-channel critically sampled filter banks for graph signals," *IEEE Transactions on Signal Processing*, vol. 67, no. 15, pp. 3954-3969, June 2019.
 - D. I Shuman, P. Vandergheynst, D. Kressner, and P. Frossard, "Distributed signal processing via Chebyshev polynomial approximation," *IEEE Transactions on Signal and Information Processing over Networks*, vol. 4, no. 4, pp. 736-751, December 2018.
 - N. Perraudin, B. Ricaud, D. I Shuman, and P. Vandergheynst, "Global and local uncertainty principles for signals on graphs," *APSIPA Transactions on Signal and Information Processing*, vol. 7, April 2018.
 - D. I Shuman, M. J. Faraji, and P. Vandergheynst, "A multiscale pyramid transform for graph signals," *IEEE Transactions on Signal Processing*, vol. 64, no. 8, pp. 2119-2134, April 2016.
 - D. I Shuman, B. Ricaud, and P. Vandergheynst, "Vertex-frequency analysis on graphs," *Applied and Computational Harmonic Analysis*, vol. 40, no. 2, pp. 260-291, March 2016.
 - D. I Shuman, C. Wiesmeyr, N. Holighaus, and P. Vandergheynst, "Spectrum-adapted tight graph wavelet and vertex-frequency frames," *IEEE Transactions on Signal Processing*, vol. 63, no. 16, pp. 4223-4235, August 2015.
 - D. Thanou, D. I Shuman, and P. Frossard, "Learning parametric dictionaries for signals on graphs," *IEEE Transactions on Signal Processing*, vol. 62, no. 15, pp. 3849-3862, August 2014.
 - D. I Shuman, S. K. Narang, P. Frossard, A. Ortega, and P. Vandergheynst, "The emerging field of signal processing on graphs: Extending high-dimensional data analysis to networks and other irregular domains," *IEEE Signal Processing Magazine*, vol. 30, no. 3, pp. 83-98, May 2013.
[Winner of the 2016 IEEE Signal Processing Magazine Best Paper Award]
 - D. I Shuman, M. Liu, and O. Wu, "Energy-efficient transmission scheduling with strict underflow constraints," *IEEE Transactions on Information Theory*, vol. 57, no. 3, pp. 1344-1367, March 2011.
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PUBLICATIONS AND PRESENTATIONS (cont.)

- Book Chapter:
- D. I Shuman and M. Liu, “Opportunistic scheduling with deadline constraints in wireless networks,” in *Performance Models and Risk Management in Communication Systems*, edited by N. Gulpinar, P. Harrison, and B. Rustem, pp. 127-155, Springer, 2010.
- Conference Papers:
- L. Fan*, D. I Shuman, S. Ubaru, and Y. Saad, “Spectrum-adapted polynomial approximation for matrix functions,” in *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Brighton, UK, May 2019.
 - Y. Jin* and D. I Shuman, “An M-channel critically sampled filter bank for graph signals,” in *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, New Orleans, LA, March 2017.
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 - B. Ricaud, D. I Shuman, and P. Vandergheynst, “On the sparsity of wavelet coefficients for signals on graphs,” in *Proceedings of SPIE Wavelets and Sparsity*, San Diego, CA, August 2013.
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 - M. Moghaddam, D. Entekhabi, L. Farhadi, Y. Goykhman, M. Liu, A. Mahajan, A. Nayyar, D. Shuman, D. Teneketzis, “Initial analyses and demonstration of a soil moisture smart sensor web,” in *Proceedings of the Earth Science Technology Conference (ESTC)*, East Adelphi, MD, June 2008.
 - D. Shuman and M. Liu, “Energy-efficient transmission scheduling for wireless media streaming with strict underflow constraints,” in *Proceedings of the International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)*, Berlin, Germany, March-April 2008, pp. 354-359.
 - D. Shuman and M. Liu, “Optimal sleep scheduling for a wireless sensor network node,” in *Proceedings of the Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, October 2006, pp. 1337-1341.
- Other Presentations:
- B. Campbell, K. Mbanisi, D. Shuman, and A. Waranyuwat, “Black and LatinX alumni experience interview report out and discussion,” presented at Olin Academic Life Meeting, February 2025.
 - K. C. Bennett, S. Liberto, S. Matsumoto, S. Michalka, C. Rodgers, and D. Shuman, “College as a Living Lab,” presented to different constituencies (alumni, students, staff, faculty, leadership, trustees) at Olin College as part of a strategic initiative, May 2024 – March 2025.
 - J. Adler, R. Matthews, and D. Shuman, “Insights from longitudinal data from students entering Olin 2014-2018,” presented at Olin Academic Life Meeting, April 2023.
 - D. Shuman (joint work with Y. Chen, J. DeJong, and T. Halverson), “Signal processing on the permutahedron: Tight spectral frames for ranked data analysis,” invited talk at the *Machine Learning and Signal Processing on Graphs Conference (LearnGraph)*, Marseille, France, November 2022.
 - P. Langer, B. Miller, and D. Shuman, “Financial model overview,” presented to different constituencies at Macalester College as part of a strategic planning process, October 2021.

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PUBLICATIONS AND PRESENTATIONS (cont.)

- Other Presentations (cont.):
- Y. Chen, J. DeJong, T. Halverson, and D. Shuman, “Signal processing on the permutahedron: Tight spectral frames for ranked data analysis,” invited talk at the *Applied Representation Theory Seminar*, co-hosted by Denison University and Harvey Mudd College (virtual), May 2021.
 - D. Shuman, “Dictionary design for graph signal processing,” invited talk at the *Applied Math Seminar*, Department of Mathematics, Yale University, New Haven, CT, January 2019.
 - D. Shuman, “Signal processing on graphs: Extending high-dimensional data analysis to networks and other irregular domains,” invited talk at the *MSCS Seminar*, Department of Mathematics, Statistics, and Computer Science, Macalester College, Saint Paul, MN, November 2018.
 - D. Shuman, “A scalable M-channel critically sampled filter for graph signals,” presented at the *Graph Signal Processing Workshop*, EPFL, Lausanne, Switzerland, June 2018.
 - D. Shuman, “Numerical linear algebra problems arising in graph signal processing,” invited talk for the research groups of Professors Yousef Saad and Daniel Boley, Department of Computer Science and Engineering, University of Minnesota, Minneapolis, MN, March 2018.
 - D. Shuman, “Dictionary design for graph signal processing,” invited talk at the *Inverse Problems and Analysis Seminar*, Department of Mathematical Sciences, University of Delaware, Newark, DE, October 2017.
 - D. Shuman, “Dictionary design for graph signal processing,” invited talk at the *Data Science Lab Seminar*, Institute for Mathematics and its Applications, Minneapolis, MN, February 2017.
 - K. Saxe and D. Shuman, “Data science: A natural fit in the liberal arts curriculum,” presented at the *SIAM Annual Meeting*, Boston, MA, July 2016. Covered in the *SIAM News Blog*: <https://sinews.siam.org/Details-Page/data-science-in-the-liberal-arts>.
 - D. Shuman, “Dictionary design for graph signal processing,” invited plenary tutorial presented at the *Graph Signal Processing Workshop*, University of Pennsylvania, Philadelphia, PA, May 2016.
 - D. Shuman, “Reflections on the development and future of Macalester’s new data science minor,” presented on an invited panel at the *AALAC Big Data Workshop*, Wellesley College, Wellesley, MA, January 2016.
 - A. Archer*, S. Faridani*, Y. Jin*, E. Weeks*, A. Beveridge, and D. Shuman, “Graph reduction methods for multiscale dictionary design,” presented at the *MAA Undergraduate Student Poster Session of the Joint Mathematics Meetings*, Seattle, WA, January 2016.
 - D. Shuman, “10-25: It’s time for the 411 on the new data science minor,” presented at the *Talking About Teaching* seminar at the Serie Center for Scholarship and Teaching as well as the Mathematics, Statistics, and Computer Science Department Tea, Macalester College, St. Paul, MN, October and November 2015.
 - D. Shuman, B. Ricaud, and P. Vandergheynst, “A windowed graph Fourier transform,” presented at the *International Traveling Workshop for Interacting Sparse Models and Technology (iTWIST)*, Marseille, France, May 2012.
 - P. Vandergheynst and D. Shuman, “Wavelets on graphs, an introduction,” invited talk at Université de Provence, Marseille, France, November 2011.
 - D. Shuman, M. Liu, and O. Wu, “Inventory control of multiple items under stochastic prices and budget constraints,” presented at the *INFORMS Annual Meeting*, San Diego, CA, October 2009.
 - D. Shuman and M. Liu, “From sleeping to stockpiling: Energy conservation via scheduling in wireless networks,” presented at the *Information Theory and Applications Workshop (ITA)*, La Jolla, CA, February 2009.

The publications and presentations listed above are available at my home page:
<http://faculty.olin.edu/dshuman/>