Jeffrey S. Vitter

Abridged Curriculum Vitæ

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Education:

- B.S. (with highest honors), Mathematics, University of Notre Dame, 1977.
- Ph.D., Computer Science, Stanford University (thesis advisor, Donald E. Knuth), 1980;
- M.B.A., Duke University, 2002.

Appointments (in reverse chronological lexicographic order of time span)**:**

Academic appointments (see full CV reachaable from `https://vitter.org/jsv` for sabbatical appointments):

- Tulane University: Adjunct Professor, Department of Computer Science, 2019–present.
- The University of Mississippi (aka Ole Miss): Chancellor, 2016–2019; Distinguished Professor Emeritus, Department of Computer and Information Science, 2020–present; Distinguished Professor, 2016–2020.
- The University of Kansas: Provost and Executive Vice Chancellor, 2010–2015; Roy A. Roberts Distinguished Professor, Dept. of Electrical Engineering & Computer Science, 2011–2015; Professor, 2010.
- Texas A&M University: Provost and Executive Vice President for Academics, 2008–2009; Professor, Department of Computer Science and Engineering, 2008–2010;
- Purdue University: Frederick L. Hovde Dean, College of Science, 2002–2008; Professor, Department of Computer Sciences, 2002–2008.
- Duke University: Chairman, Department of Computer Science, 1993–2001; Gilbert, Louis, and Edward Lehrman Professor (Distinguished Pofessorship), 1993–2002;
- Brown University: Professor, Department of Computer Science, 1988–1993; Associate Professor, 1985–1988; Assistant Professor, 1980–1985.

Appointments in the Professional Community (see full CV for complete list):

- Sigma Xi: 1983–present. Served at multiple university institutions as administrative sponsor and participant in Sigma Xi chapters. Two examples:
  - Provided college support at Purdue for the Sigma Xi chapter's Distinguished Lectureship and activities.
  - Provided institutional support at Texas A&M to the Sigma Xi chapter for annual distinguished science awardee presentations and receptions and annual president-elect directed research symposia, as well as engagement with local school teachers and students and annual awards to top teachers and students.
- Phi Beta Kappa, 1977–present.
- Association for Computing Machinery (ACM): Joined 1980; Fellow, 1996–present; SIG Governing Board, 1997–2001; ACM SIGACT (Special Interest Group on Algorithms and Computation Theory): Executive Committee (1987–2005), Past chair (2001–2005), Chair (1997–2001).
- Institute of Electrical and Electronics Engineers (IEEE): Joined IEEE and IEEE Computer Society, 1980; Fellow, 1993–present. .
- John Simon Guggenheim Memorial Foundation: Fellow, 1986–present.
- American Association for the Advancement of Science (AAAS): Joined 2003; Fellow, 2009–present.
- Tulane University: Board of Advisors, School of Science and Engineering: Emeritus member (2014–present), Member (2006–2014), Technology Transfer and Business Development Committee (2009–2014), Computer Science Task Force (2010–2014), Planning and Operations Committee (2006–2009).
- Phi Kappa Phi, 2017–present.
- The Millennium Institute for Foundational Research on Data (IMFD), Santiago, Chile: International Advisory Board, 2018–present.
- National Academy of Inventors (NAI): Fellow, 2018–present.
- Asia-Pacific Artificial Intelligence Association (AAIA): Fellow, 2022–present.
- De La Salle High School, New Orleans, LA: Board of Trustees, 2019–2025.
- Baidu Research: Board of Advisors, 2019–2022.
- Association of Public and Land-grant Universities (APLU): Council of Presidents, 2016–2019; Commission on Innovation, Competitiveness, and Economic Prosperity (CICEP), 2015–2020; Commission on Information, Measurement, and Analysis (CIMA), 2015–2020; Oversight Board, Personalized Learning Consortium (PLC), 2013–2018; Commission on Access, Diversity and Excellence (CADE), 2014–2017; Council on Academic Affairs, 2008–2015: Executive committee (2010–2015), Co-chair of Committee on Research and Graduate Education (2012–2015), Chair of executive committee (2014–2015), Past chair of executive committee (2015), Chair-elect of executive committee (2013–2014), Task Force on Graduate Program Disclosure (2010–2012).
- University of Mississippi Foundation: Board of Directors, 2016–2019.
- University of Mississippi Research Foundation: Board of Directors, 2016–2019.

- Southeastern Universities Research Association (SURA): Council of Presidents, 2016–2019.
- Innovate Mississippi: Board of Directors, 2016–2019.
- Center for Massive Data Algorithmics (MADALGO), Danish National Research Foundation, Aarhus University, Århus, Denmark: Board of Advisors, 2009–2017.
- Computing Research Association (CRA): Co-chair, Government Affairs Committee, 2001–2016; Board of Directors, 2000–2009; Computing Research Funding Task Force, 2005–2009.
- National Science Foundation (NSF): Advisory Committee, Directorate for Computer and Information Science and Engineering, 2012–2016.
- The University of Kansas: Chair of Board of Directors, KU Innovation and Collaboration (KUIC), 2010–2015; Vice Chair of Board of Directors, KU Center for Research (KUCR), 2010–2015; Board of Directors, Kansas Athletics, Inc.: Vice chair (2012–2015), Finance and Audit Committee (2012–2015).
- Association of American Universities (AAU): AAU-ARL (Association of Research Libraries) Task Force on Scholarly Communication, 2014-2015; Co-chair, AAU Copyright Working Group, 2014–2015.
- Bert Nash Community Mental Health Center, Lawrence, KS.: Governing Board of Directors, 2015.
- Proposer of concept and participant in design of what became the Purdue University Research Expertise database (PURE) and the Indiana Database for University Research Expertise (INDURE), 2003–2008.

Editorial Appointments:

- *PeerJ Computer Science*: Academic advisory board, 2015–present; Editorial board, 2015–present.
- Co-editor, *From Strings to Graphs, and Back Again: A Festschrift for Roberto Grossi's 60th Birthday*, Schloss Dagstuhl — Leibniz-Zentrum für Informatik, Dagstuhl Publishing, Germany, 2025.
- Steering committee, *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, 2012–2017.
- Editorial board, *Theory of Computing Systems*, 1991–2014.
- Co-editor, *Academic Leadership in Higher Education: From the Top-down and the Bottom-up*, Rowman-Littlefield, Lanham, MD, 2015.
- Editorial board, *Algorithmica*, 1994–2011.
- Co-editor, *Proceedings of the ACM Workshop on Paradigms of Computing and Knowledge*, June 2003.
- Co-editor, special issue of *ACM Journal on Experimental Algorithmics* on algorithm engineering, **5**, 2000.
- Co-editor, *External Memory Algorithms*, DIMACS Series on Discrete Mathematics and Theoretical Computer Science, American Mathematical Society, 1999.
- Co-editor, *Algorithm Engineering*, Lecture Notes in Computer Science, **1668**, Springer, Berlin, 1999.
- Editorial board, *SIAM Journal on Computing*, 1989–1997.
- Editorial board, *Communications of the ACM*, 1988–1995.
- Co-editor, working group report on strategic directions in storage I/O for large-scale computing, *Computing Surveys*, **28** (4), December 1996.
- Editor, special double issue of *Algorithmica* on Large-Scale Memories, **12**(2–3), 1994.
- Editorial board, *IEEE Transactions on Computers*, 1987–1991.
- Editor, special issues of *Algorithmica* on parallel & distributed computing, Part I, **3**(1) & Part II, **3**(3), 1988.
- Co-editor, special issue of *IEEE Transactions on Computers* on sorting, **C–34**(4), April 1985.

Ten Example Publications: Dr. Vitter has well over 350 book, journal, conference, and patent publications, primarily in four subfields of big data and data science: external memory algorithms, compressed data structures, data compression (of text, biological structures, images, and video), and machine learning (AI) and prediction. His Google Scholar h-index is in the 80s, and he has been an ISI highly cited researcher. The publications below and much of his other work can be downloaded from his online publication library, accessible at `https://vitter.org/jsv/`. Dr. Vitter's full curriculum vitæ can also be accessed there.

1. J. S. Vitter and W.-C. Chen. *Design and Analysis of Coalesced Hashing*, Oxford University Press, New York, NY, 1987, 160 pages + xii.
2. J. S. Vitter. "Design and Analysis of Dynamic Huffman Codes," *Journal of the ACM*, **34**(4), October 1987, 825–845. A shorter version appears in "The Design and Analysis of Dynamic Huffman Coding," *Proceedings of the 26th Annual IEEE Symposium on Foundations of Computer Science (FOCS '85)*, Portland, OR, October 1985, 293–302.
3. P. G. Howard and J. S. Vitter. "Arithmetic Coding for Data Compression," invited paper in *Proceedings of the IEEE*, **82**(6), June 1994, 857–865.
4. J. S. Vitter and P. Krishnan. "Optimal Prefetching via Data Compression," *Journal of the ACM*, **43**(5), September 1996, 771–793. This work led to a patent with coinventor K. Curewitz (see full CV).
5. J. S. Vitter and M. Wang. "Approximate Computation of Multidimensional Aggregates of Sparse Data Using Wavelets," *Proceedings of the ACM SIGMOD International Conference on Management of Data (SIGMOD '99)*, Philadelphia, PA, June 1999, 193–204. Recipient of the 2009 SIGMOD Test of Time award for the most impactful paper from SIGMOD '99.

6. D. T. Hoang and J. S. Vitter. *Efficient Algorithms for MPEG Video Compression*, John Wiley & Sons, New York, NY, 2002, 169 pages + xxii.
7. R. Grossi and J. S. Vitter. "Compressed Suffix Arrays and Suffix Trees with Applications to Text Indexing and String Matching," *SIAM Journal on Computing*, **35**(2), 2005, 378–407. A shorter version appears in *Proceedings of the 32nd Annual ACM Symposium on Theory of Computing (STOC '00)*, Portland, OR, May 2000, 397–406. A special workshop on compressed self-indexes is being held July 25, 2005 following the Symposium on Experimental Algorithms to recognize this conference paper's 25th anniversary.
8. J. S. Vitter. *Algorithms and Data Structures for External Memory*, Series on Foundations and Trends in Theoretical Computer Science, Volume 2, Issue 4, Now Publishers, Hanover, MA, 2008, 174 pages + xv. A shorter version appears in "External Memory Algorithms and Data Structures: Dealing with Massive Data," *ACM Computing Surveys*, **33**(2), June 2001, 209–271.
9. W.-K. Hon, R. Shah, S. V. Thankachan, and J. S. Vitter. "Space-Efficient Frameworks for Top-k String Retrieval," *Journal of the ACM*, **61**(2), April 2014, 9.1–9.36. An earlier version appears in *Proceedings of the IEEE Symposium on Foundations of Computer Science (FOCS '09)*, Atlanta, GA, October 2009, 713–722.
10. H. Huo, P. Liu, C. Wang, H. Jiang, and J. S. Vitter. "CIndex: Compressed Indexes for Fast Retrieval of FASTQ Files," *Bioinformatics*, **38**(2), January 2022, 335–343, `doi.org/10.1093/bioinformatics/btab655`.

Research Funding Leadership: Dr. Vitter has been PI or co-PI of personal external research grants totaling over $25 million. The list below shows 10 of his more recent personal research grants:

1. 2023–2026, National Natural Science Foundation of China, "High-Order Entropy-Compressed Indexes and Retrieval for Pan-Genome," Principal Investigator H. Huo, Co-Principal Investigator J. S. Vitter, Xidian University, 540,000 RMB.
2. 2010–2014, National Science Foundation, "Pattern Matching for Massive Data Sets," the University of Kansas (subcontracted from Louisiana State University, as part of a $500,000 collaborative research grant with Co-Principal Investigators R. T. Shah and J. S. Vitter), $235,773.
3. 2006–2010, National Science Foundation, "Performance Models and Systems Optimization for Disk-Bound Applications," Co-Principal Investigators M. S. Thottethodi, J. S. Vitter, R. T. Shah, T. N. Vijaykumar, and V. S. Pai, Purdue University, $889,788.
4. 2004–2007, National Science Foundation, "Entropy-Compressed Data Structures," Principal Investigator J. S. Vitter, Purdue University, $255,000.
5. 1999–2003, National Science Foundation, "External Memory Algorithms: Dealing with MASSIVE Data," Duke University and Purdue University, Principal Investigator J. S. Vitter, $290,000.
6. 2000–2003, Microsoft Research, "Interactive Research/Teaching Classroom," Duke University, Co-Principal Investigators J. S. Vitter, R. Lucic, L. Arge, O. L. Astrachan, J. S. Chase, C. S. Ellis, D. Ramm, S. Rodger, and A. Vahdat, $1,191,470.
7. 2000–2003, National Science Foundation, "Algorithms for Active Storage," Duke University, Co-Principal Investigators J. S. Vitter and J. S. Chase, $252,000.
8. 2001–2003, Army Research Office, "External Memory Algorithms: Dealing with MASSIVE Data," Duke University and Purdue University, $90,985, Principal Investigator J. S. Vitter,
9. 1998–2002, National Science Foundation, "Geographic Information Systems on High-Speed Clusters: A Vertically Integrated Approach," Duke University, Co-Principal Investigators J. S. Chase, P. K. Agarwal, L. Arge, P. N. Halpin, D. L. Urban, and J. S. Vitter, $1,185,900.
10. 1995–2001, Army Research Office, Multidisciplinary Research Program of the University Research Initiative, "Applicable and Robust Geometric Computing," Co-principal investigators J. S. Vitter and P. K. Agarwal, Duke University (subcontracted from the Center for Geometric Computation at Brown University, as part of a $4,500,000 grant with participating institutions Brown, Duke, and Johns Hopkins Universities), $1,489,042.

Fundraising: Engaging with key stakeholders is crucial for raising necessary resources. Dr. Vitter has found it tremendously rewarding to personally engage alumni, partners, and friends around their passions. It is very special when donors go beyond a sense of loyalty and make major philanthropic gifts because of their passion for what the university is doing. At Purdue, he secured major philanthropic gifts for new computer science and structural biology buildings. At KU, he proposed and led the lobbying for major recurring funding from state government that allowed KU to hire 12 Foundation (Distinguished) Professors to spark success in the multidisciplinary priorities in the new strategic plan. At the University of Mississippi, he restructured fundraising at the university level to include the UM Medical Center and achieved record private fundraising. (See full CV for details.)

Leadership and Professionalism — Five Synergistic Activities (see full CV for details)**:**

1. In leadership roles as university chancellor, provost, dean, and department chair, Dr. Vitter has had particular success in advancing research excellence and output — especially by fostering multidisciplinary collaborations and engaged scholarship at Purdue, Texas A&M, KU, and the University of Mississippi.

2. Much success has come from his focus on listening and learning, which brought forward inclusive and impactful strategic plans at Duke, Purdue, Texas A&M, KU, and the University of Mississippi.
3. This inclusive approach also enabled the tackling of especially difficult issues, such as renovating (in the case of Purdue) or creating the first ever (in the case of KU) cohesive undergraduate curriculum. As an example, the KU community overwhelmingly agreed that a unifying, integrative curriculum was needed to replace the school-specific curricula, which discouraged changing majors and often had no particular rationale. Earlier attempts in previous decades had failed miserably and led to pessimism. The key to success was finding consensus on key outcomes and then collaboratively designing pathways to meet them.
4. An essential part of advancing a university is to hire excellent people — always looking to get better. With his advisory committee chair at Purdue, Dr. Vitter designed a new approach called "Hiring for Excellence," which focused on key traits that enable excellence in the role in question. It involved an extra interview phase (akin to airport interviews, but done by phone) in which candidates could demonstrate how they approach situations posed to them along with relevant experiences. The result at Purdue and KU (where it was rolled out campuswide) was stellar hires and simultaneously a dramatic increase in the percentage of women and minority hires. A key advantage of this approach is that the new hires were uniformly respected as first-class hires, since they were the best candidates in their pools and not hired for reasons such as ethnicity or gender, and as a result the new faculty overwhelmingly thrived and succeeded.
5. Dr. Vitter has extensive experience in organizational change and efficiencies in his administrative roles at Duke, Purdue, Texas A&M, KU, and UM. As an example, he co-led the Changing for Excellence program at KU, the result of campus-wide working groups. The program restructued and improved administrative services in 11 areas and realized savings that could be invested in the *Bold Aspirations* strategic plan and Campus Master Plan.

Commitment to Diversity and Inclusiveness (see full CV for details)**:**

- The nation's future prosperity and security depends upon a steady stream of talented scientists and engineers. Increasing pathways for women and minorities to enter fields in science and engineering are important. Much improvement needs to be made at the elementary and high school levels, with the help of strong family structures. At the university level, introductory courses are needed to capture students' interests and draw them into technical fields. Dr. Vitter worked hard to facilitate active learning, and at the University of Mississippi he started a successful effort to partner with the Gates Foundation and APLU as one of eight universities chosen to build critical mass in active learning methodologies and online education.
- Women and minorities succeed better when they can identify with mentors and teachers. Dr. Vitter's Hiring for Excellence approach described in item 4 above was a great success at Purdue and KU; it focused on excellence and first-class hires, resulting in many hires of women and minorities. As Texas A&M provost, this approach led to diverse hires in six of the eight dean and vice president searches.
- He engaged the broader University of Mississippi community in a highly regarded process — with positive coverage by *The Atlantic* and *The New York Times* — to contextualize campus sites and southern symbols, so as to acknowledge the problems of the past, learn from them, and create a welcoming environment.
- In the University of Mississippi strategic plan *Flagship Forward*, he created a transformative initiative of engaged scholarship called M Partner. It continues to build long-term vibrancy in targeted Mississippi communities through collaborations of community members, faculty, staff, students, and external partners.
- At the University of Mississippi, he created the position and hired the first-ever vice chancellor for diversity and community engagement.

Mentoring: Dr. Vitter played a strong role in mentoring students and postdoctoral assistants, including females and those of diverse backgrounds. A list of his 15 Ph.D. advisees, 5 Master's advisees, and 13 postdoctoral assistants, along with numerous students on whose thesis committees he served, can be found in his full CV at `https://vitter.org/jsv`. He mentored dozens of undergraduates as UTAs, including the late Randy Pausch.

International Experiences:

- Dr. Vitter is mostly fluent in French.
- He spent full-year sabbaticals in INRIA Rocquencourt and Ecole Normale Supérieure in Paris (1986–1987) and INRIA Sophia-Antipolis (1998–1999) and extended visits to University of Aarhus (1998), Ecole Normale Supérieure in Paris (1988, 1989), and Asian School on Computer Science in Bangkok (1988).
- He oversaw the Texas A&M engineering educational and research programs in Education City, Qatar, regarded by the Qatar Foundation as its model partner and the most successful program in the Persian Gulf region.

Major Awards, Fellowships, Invited Lectureships, and Honors: (see full CV for complete list)**:**

- 1983–present, Sigma Xi.
- 1977–present, Phi Beta Kappa.
- 1986–present, Fellow of the John Simon Guggenheim Memorial Foundation.

- 1993–present, Fellow of the Institute of Electrical and Electronics Engineers (IEEE), for contributions to the theory of sorting and searching and to the design and analysis of computer algorithms.
- 1996–present, Fellow of the Association for Computing Machinery (ACM), for contributions to the theory of information storage and retrieval and to the design and mathematical analysis of computer algorithms.
- 2009–present, Fellow of the American Association for the Advancement of Science (AAAS), for distinguished contributions to the design and analysis of efficient computer algorithms and data structures, particularly those involving massive amounts of data.
- 2017–present, Phi Kappa Phi.
- 2018–present, Fellow of the National Academy of Inventors (NAI), for impact in the field of computer and information science.
- 2022–present, Fellow of the Asia-Pacific Artificial Intelligence Association (AAIA), for outstanding achievements in the area of big data and data science.
- 2019, Albert Nelson Marquis Lifetime Achievement Award.
- 2017, CEO Award of Mississippi, awarded by the Mississippi Business Journal to recognize leaders around the state who demonstrate excellence among the top executives in their field.
- 2009, SIGMOD Test of Time Award, awarded by the Association for Computing Machinery (ACM) Special Interest Group for Management of Data (SIGMOD) for the most impactful SIGMOD paper from 10 years earlier, "Approximate Computation of Multidimensional Aggregates of Sparse Data Using Wavelets."
- 2001, 1997, Recognition of Service Award, Association for Computing Machinery (ACM).
- 1998, Fulbright Scholar, during sabbatical in Sophia-Antipolis, France.
- 1985–1991, National Science Foundation Presidential Young Investigator Award.
- 1984–1988, IBM Faculty Development Award.
- 1977–1980, National Science Foundation Graduate Fellow, Stanford University.
- 1973–1977, Notre Dame Scholar, University of Notre Dame.
- 1977, General Electric Mathematics Major Award.

Major Career Contributions and Legacy:

- Dr. Vitter's top contribution and legacy are his family. They are his main career; nothing is more gratifying than having such a wonderful partner in marriage for 43 years and three kids who have blossomed into tremendously productive and decent individuals — and four grandkids so far! He and his spouse are active genealogists at `vitter.org`, with over 92K individuals in their family tree and three dozen family histories.
- He draws much satisfaction from the success of his students and postdocs (see the "Mentoring" section).
- Research into new solutions — and the beautiful mathematics that enable them — has always been a key driver in Dr. Vitter's career. He works primarily in four key subfields of big data and data science: external memory algorithms, compressed data structures, data compression (of text, biological structures, images, and video), and machine learning (AI) and prediction. Some highlights:
  - He has 375+ publications, has a Google Scholar h-index in the 80s, and was an ISI highly cited researcher.
  - His thesis work on optimizing coalesced hashing (see publication 1) has been widely incorporated into practice, such as in his thesis advisor Don Knuth's TeX and Metafont systems.
  - His works on random sampling have received 2,500+ citations as a key subroutine in applications.
  - He demonstrated how to do provably-efficient dynamic Huffman coding (publication 2).
  - His lossless image compressor co-developed with a student has been implemented in hardware on the Mars Reconnaissance Orbiter.
  - In video compression, he co-developed the paradigm of minimizing the combined measure of rate plus distortion (publication 6); this idea has since been incorporated into the H.264/MPEG-4 AVC standard's reference encoder, used widely in the computing and communications industry.
  - He and a former student received the 2009 SIGMOD Test of Time Award for the most impactful paper from 10 years earlier, for the novel use of wavelets to approximate database queries (publication 5).
  - With a colleague, he developed the first text index that uses only linear space, and it is being honored at a special workshop in July 2025 on its 25th anniversary (publication 7).
  - In follow-up work in 2003, they created the wavelet tree data structure — now ubiquitous in text indexing (not to be confused with wavelet trees for multiresolution approximation (two bullets above)).
  - He played a key role in developing the research area of external memory algorithms (publication 8).
- Dr. Vitter has played a longtime leadership role in international conferences and journal editing (see full CV).
- He has found much enjoyment and success in bringing people together to do great things, an approach that has driven his efforts in strategic planning and leadership at multiple institutions, as described earlier in the "Leadership and Professionalism" section.
- He has worked especially hard to foster connections and large-scale research collaborations, such as in item 5 in the "Leadership and Professionalism" section. One of the KU Foundation Professors he hired is PI for a recently-awarded $26 million NSF Engineering Research Center.