Welcome to Boston University
Faculty of Computing & Data Sciences

Azer Bestavros
W. F. Warren Distinguished Professor of Computer Science
Associate Provost for Computing & Data Sciences

May 2023

Boston University: By the Numbers (circa 2021)

- Institution: 4th largest private University in the US
- Alumni: 1st woman PhD; 1st African-American and 1st Native-American MDs
- Ranked: 27th best US colleges by WSJ/THE & 20th (3rd in MA) for excellence and employability
- Rated: 38th best by U.S. News & World Report for academic excellence and economic value
- Named: 17th best global college in Big Cities by Newsweek
- Member of the AAU elite set of 62 research universities (with Harvard & MIT from Boston Area)
- Size: 33,000 students; 3,850 faculty; 500 postdocs; 250 fields; 17 colleges
- Finances: $5.2B in assets; $1.6B endowment; $1.8B operating revenues
- Students: top 10 most ambitious and 12th most employable graduates in US
- Faculty: 4 Nobel, 2 Pulitzer, 47 Guggenheim, 32 Sloan, 24 AAAS, ...
- Research Peaks: 12 BU Institutes, e.g., computing, health, neuroscience, ...
- Research Funding: $575M BU and $150M BMC
- Industry: 200+ companies with BU-licensed products
- Urban Campus: Main Campus 135 acres; Medical Campus 80 acres
- Celebrities: Graham Bell; MLK; Geena Davis; Leonard Nimoy aka Spock!
- Fun Fact: Has only US spot where planes fly over cars over trains over boats
Computing at BU: Decades in the making

Recent Milestones
- 2011: Hariri Institute for Computing is created as an incubator for data-driven research
- 2014: Provost launches the Data Science Initiative to grow data science faculty
- 2018: President & Provost Taskforce charged with envisioning the future of Data Science at BU
- 2018: BU announces plans for the new Center for Computing & Data Sciences
- 2019: Faculty of Computing & Data Sciences is created in response to DS Taskforce Report

"The university is stronger, more intellectually vibrant, and more able to adapt to the changing world if disciplines are integrated and interconnected with each other."
- Robert A. Brown (April 2018)

The Center for Computing & Data Sciences
Construction started Fall 2019 and completed Fall 2022

- Iconic 19 stories, 345,000 square feet of state-of-the-art classrooms, labs, and collaboration spaces at the heart of the Charles River Campus
- A major addition of prime campus space at the crossroads of the major corridors connecting key academic and residential centers of mass at BU
- Home for the Departments of Computer Science and Math & Stats, the Hariri Institute, and the Faculty of Computing & Data Sciences
- A bold statement about BU’s commitment to data-driven discovery & innovation and to the vibrant academic experience for its students
Faculty of Computing & Data Sciences at BU

CDS: Vision, Mission, and Progress
By Azer. Bestavros

May 2023
8 more reasons to be proud

| #1 | Resilient Design – first floor 1.25’ above University’s Elevation for Resilience |
| #2 | Energy Efficient – exterior sun shading + triple glazing + efficient systems |
| #3 | Fossil Free & Carbon Free – no gas line: geothermal + 100% renewable energy |
| #4 | Indoor Environmental Quality – connected spaces + access to daylight and views |
| #5 | Outdoor Environmental Quality – 8 green roofs at terraces |
| #6 | Embodied Carbon – over 13% reduction in emission from construction process |
| #7 | Zero Waste – planned for TRUE Zero Waste Certification |
| #8 | Climate Leadership – tracking LEED Platinum + model for future Boston buildings |

BU’s Most Sustainable Building
Faculty of Computing & Data Sciences
Vision, Mission, and Progress

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Associate Provost for Computing & Data Sciences

The Faculty of Computing & Data Sciences (CDS)
Launched Fall 2019

... where ivory tower meets public square

- Interdisciplinary, degree-granting academic unit with faculty appointed in CDS and jointly across BU
- Nationally unique organization as a cross-cutting unit under the Provost office -- not a department, not a division, not an institute, and not a school
- Porous organization that augments and connects traditional disciplines of computing & data sciences

⇒ To democratize access by students, faculty, and organizations to data-driven innovation in computing & AI
CDS: Molding the ivory tower into a public square

The Faculty of Computing & Data Sciences (CDS)

**Vision:**
We strive to improve the human condition by bringing computational and data-driven technologies, systems, and processes to bear on the greatest challenges of our world.

**Mission:**
We conduct cutting-edge research that matters to society; we provide students with rigorous education and vibrant academic experiences that unleash their innovative capacities; and we democratize access by learners, researchers, practitioners, and the public to the transformative power of computation and data.

**Values:**
We reward creativity and excellence; we recognize collaborative endeavors; we respect and trust each other; we celebrate our diversity of perspectives and lived experiences; and we uphold our moral and ethical responsibilities to the fullest.
CDS: Academic Programs

**Undergraduate Major in Data Science** (launched Fall 2021, first matriculates in Fall 2022)
- Spiral approach for coverage of data science foundations (a.k.a. math on demand)
- Two pathways that equalize “methodological” and “in the field” tracks
- Focus on experiential learning and practicums (early and often) through BU Spark!

**Graduate PhD in Computing & Data Sciences** (launched in 2020, first cohort started in Fall 2021)
- Holistic admission to increase intake from broader (non-CS) backgrounds
- Two-year cohort model + Lab rotations = late-binding to build community and close skills gap
- Bioinformatics program integrated in CDS; degree conferred by CDS; first matriculates in Fall 2023

**Undergraduate Minor in Data Science** (launched Spring 2022)
- Two pathways: Basics of DS for non-STEM students + Depth in DS for STEM students
- Designed to serve either as a ramp or exit for applied data science disciplines

**Graduate Professional MS in Data Sciences** (launching Fall 2023)
- MS in Data Science, MS in DS + X, joint programs (e.g., BA/MS, JD/PhD, ...), certificate programs
- On-line at scale upskilling and reskilling programs launching in 2024

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**Integrative Pedagogy: Spiral DS Curriculum at BU**

- **Experiential**
  - Fluency: Design and implementation of DS pipelines
  - Competency: Concepts, methods, and tools of DS
  - Literacy: Basic programming and data analysis
  - Appreciation: Critical thinking with data

- **Algorithms**
- **Mathematics**
- **Programming**

**Widening the DS Pipeline**
- Motivated by real-world applications
- No presumed exposure to math or CS
- No detached/standalone prerequisites
- Integrated social and ethical considerations
CDS: Faculty Growth & Areas

1. **Transdisciplinary ML & AI**: Foundational research at the interface of algorithms, info theory, optimization, mathematics, stats, and basic sciences. Examples:
   - Learning Theory: Robust ML, Causal ML, Scientific ML, Info-theoretic ML, Quantum ML, etc.
   - Big Data Methods: Streaming/sublinear-time algorithms, Compressive sensing, Federated ML, etc.

2. **DS & AI in the Field**: Data mining, machine learning, and AI systems, inspired by concepts from, or addressing unique challenges in specific domains. Examples:
   - Health & Biomedical Sciences: CompBio, Bioinformatics, Precision Medicine, etc.
   - Environmental & Sustainability Sciences: Smart Grids, Geospatial ML, Green Computing, etc.

3. **Sociotechnical & Human-in-the Loop Systems**: Algorithms, protocols, and platforms that operate within legal, economic, and public policy frameworks. Examples:
   - Civic Tech: Secure/private/verifiable/trusted Computing, Countering mis/disinformation, etc.
   - Social Computing & AI: Mech Design, Meta Learning, Explainable/Fair ML, NLP, HCI, AGI, etc.

+ **Clinical & Of the Practice Teaching Faculty** in data science, machine learning, and AI

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CDS: Faculty Members – Tenure Stream

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<th>Name</th>
<th>Position/Department</th>
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CDS: Faculty Members – Teaching Stream

Tania Chatterjee (PhD'21)
Clinical Assistant Prof.
Network Algorithms

Kevin Gold (PhD'08)
Yale University, CS
Associate Prof. of the Practice
Machine Learning & AI

Leonidas Kontothanassis (PhD'96)
U Rochester, CS
Professor of the Practice
Content Distribution

Langdon White (BS'97)
Siena College, CS
Clinical Assistant Prof.
Software Engineering

A former software engineer and a Yale scientist looking at network anomalies from Biology to Politics, with a passion for undergrad teaching and mentorship.

Former CS faculty at Wellesley and NEU with 15 years of industry experience as software engineer at Google and as a research scientist at MIT Lincoln Lab.

Industry veteran with 26 years of experience in the corporate world, most recently as senior engineering director at Facebook/Meta and Google.

A 20+ year veteran of the software industry, the last 10 at Red Hat, having served as CTO, Chief Architect, and VP at companies from startups to Fortune 50.

CDS: Faculty Research “that matters”

Using viral load and epidemic dynamics to optimize pooled testing in resource constrained settings
Bria Cleary, James A. Hay, Brendan Blumenstein, Morgan Hurdon, Michelle Cipczynski, Jim Beaney, Brooke Simonson, David Hong, Midday Senghor, Abdul K. Seay, Stacey Gabriel, Ann Ragen, Michael J. Minn
doi: https://doi.org/10.1103/2020.05.61.206868

Reducing Inefficiency in Carbon Auctions with Imperfect Competition
Ika Goldzweig
department of Computer Science, Columbia University, New York, NY, USA
iak@cs.columbia.edu

Protectioning Cryptography Against Compelled Self-incrimination
Sarah Schnell and Mayank Varia, Boston University

The Role of Computer Security Customer Support in Helping Survivors of Intimate Partner Violence
Yiwen Zou and Allison McDonald, University of Michigan
Julia Narakopoulou, Nicole Dell, and Thomas Ristenpart, Cornell Tech
Werner Research Group; Florian Schaub, University of Michigan
Azer Tamerney, Werner Research Group

The Democratizing Potential Of Algorithms?

Discredited Data
Posted: 28 Apr 2021

Ngozi Onwudozie
Yale University - Benjamin N. Cardozo School of Law

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CDS: Vision, Mission, and Progress
By Azer. Bestavros
Codifying Collaboration & Citizenship

Excerpts from tenure and promotion criteria for CDS

1. Scholarship = Collaborative Research Impact
   “Evidence of research impact includes collaboration with researchers and/or practitioners from different disciplines leading to tangible outcomes, exemplified by cross-disciplinary citations to published works, use of software tools or data by researchers or practitioners from different communities, impact on industry standards, public-interest technology platforms, policy frameworks, among others.”

2. Teaching and Service = Citizenship in University and Civic Society
   “Evidence of excellence in community building and outreach includes a track record of catalyzing broad collaborations among diverse stakeholders from inside the university as well as from the outside, in support of the broader societal impacts of and public interest in computing and data sciences.”
CDS: Connecting Tissue for BU Faculty

CDS Faculty Fellows Program
“To provide newly recruited faculty in various disciplines at BU with opportunities for connecting with CDS faculty and programs.”

CDS CHASS Initiative
“To create a faculty network that promotes the use of computational and data-driven methods in disciplines that have not been traditionally associated with computing and data sciences.”

CDS: Connecting Tissue for BU Curricula

CDS Teaching Rotation Program
“To facilitate collaboration across units aimed at disseminating best practices around data science teaching. It will broaden participation in data science instruction at BU, and through that participation bring high-quality data science course experiences to students both in CDS and in the faculty member’s home department.”
CDS = Computing for Real-world Impact
Hubs for impact on Health, Sustainability, Equity, and Civic Tech

PEOPLE organized around co-Labs

Faculty
- CDS founding + affiliated faculty (CDS expertise)

Students
- PhD + Master’s + Ugrad students (work capacity)

Experts
- Partners from BU and outside orgs (domain expertise)

ACTIVITIES & OUTPUTS: supporting mission of co-Labs

Research
- Sponsored projects, community projects, internships and externships

Curricular
- Project-based courses, cross-college challenge, directed studies, lab rotations, certificate programs

Co-Curricular
- Convenings and collective agenda setting, roundtables, hackathons, student clubs

COMMON SUPPORT & INFRASTRUCTURE

Software/data Engineering and Tech Consultancy
Project/Partner Management
Student Recruitment, Mentoring & Placement
Pre/Post Award Grant Administration
Event Management and Communications

CDS Hub for Civic Tech Impact
Tools, Software, and Algorithms for Better Governance

BU Today
News, Opinion, Community

Computing & Data Sciences faculty offer direction for design, privacy, and security at BU event
Justice Media & Computational Journalism co-Lab

**COLLABORATING ENTITIES:**
- Boston University Faculty of Computing & Data Sciences
- Boston University College of Communication

**ACTIVITIES:**

**Curricular**
- XCC 433: Justice Media Computational Journalism Course
  - CDS/CS/CE/COM Students
  - 4 Hub Units (Writing Intensive)
  - Investigative computational journalism projects with partners

**Co-Curricular**
- Curricular and Co-Curricular: Data Science and ML Projects (2018-2020)
  - Federal prosecutorial misconduct (The Intercept)
  - State procurement contracts & Black businesses (WGBH)
  - Police Payroll (WGBH)
  - Police campaign contributions (The Globe & Banner)
  - Real Estate in Boston’s Minority Neighborhoods (Baystate Banner)
- Co-Curricular: Summer Bootcamp & Externship Program (Summer 2020)
- Research: Racial bias in media coverage (AIEM, WGBH, NAACP)

**Responsible Use of Data co-Lab**

“BU is standing up a phenomenal new center for computing and data science. Its students have skills, knowledge, and experience that can benefit our growth as well.”

– Adam Fox, Head of Data at MassMutual
2848+ students 725+ semester projects 7 courses 260+ innovation fellows 60+ mentors 10+ resident experts 25 student clubs 4 hackathons (AY 2022/23)

CDS: Vision, Mission, and Progress
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CDS: By the Numbers (FY 2023)

Faculty & Research
- 3 rounds of faculty searches, yielding 11 core hires: 6 tenure-track (3 women); 1 tenured; 2 joint
- 47 faculty members with appointments in or affiliated with CDS from 24 departments in 11 schools
- 2 endowed professorships in AI and in Environmental DS and 3 endowed PhD fellowships established
- Governance transitioned in 2022 from 30+ founding members to 25 faculty with appointments in CDS
- $4M gift from MassMutual ($2M in endowment) to set up co-Lab on Responsible Use of Data
- $3M of grants and contracts from NSF, foundations, and industry supporting Civic Tech

Students & Curriculum
- 17 students (60% domestic; 54% women) in the PhD program in Computing & Data Sciences
- 78 F’22 matriculants in the Data Science BS program (46% women; 23% first gen; 15% URG)
- 194 majors (39% women) in DS; 63 minors in DS (49% women) from 19 different programs
- 56 undergraduate courses in inventory; 30 offered in AY’23 (12 in F’22 and 18 in S’23)
- 950 (576) undergraduate students enrolled (seats filled) in S’23 (F’22)

Thank you!