Faculty of Computing & Data Sciences
Vision, Mission, and Progress

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

April 2022

Data Science at BU: Decades in the making

Key Milestones

- 1983: CS Department splits from Math Department
- 1988: Program in Cognitive & Neural Systems goes live
- 1990: Center for Computational Science is created
- 2009: BU co-founds regional HPC data center with MIT, Harvard, U Mass, and NU
- 2011: Hariri Institute for Computing is created as an incubator for data-driven research
- 2014: Provost launches the Data Science Initiative to grow faculty in DS
- 2018: BU announces plans for the new building for Computing & Data Sciences
- 2019: Faculty of Computing & Data Sciences is created as new academic home for DS

“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)

CDS: Vision, Mission, and Progress
By Azer. Bestavros
The Center for Computing & Data Sciences
Move-in: November 4, 2022 / Ribbon Cutting: December 8, 2022

Live Cam Views

The Center for Computing & Data Sciences

- 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 CAS Departments of Computer Science and Mathematics & Statistics, 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
The Faculty of Computing & Data Sciences (CDS)
Launched Fall 2019

Molding the ivory tower into a public square

- New interdisciplinary, degree-granting academic unit with faculty members appointed in CDS and jointly across BU
- Porous organization that augments and connects the traditional disciplines underlying computing & data sciences

⇒ To democratize access by students, faculty, and organizations to data-driven innovation in computing & AI
CDS at a Glance: Academic Programs

**Undergraduate Major in Data Science** (launched Fall 2021, first matriculates by 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
- Degree as a base for a minor in another discipline (and vice versa)
- Focus on experiential learning and practicums (early and often)

**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 with late-binding to build community and close skills gap
- Lab rotations to catalyze interdisciplinary research and industry engagement

**Undergraduate Minor in Data Science** (launching Spring 2022)
- Two pathways: Basics of DS for non-STEM vs 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** (under development for launch by Fall 2023)
- MS in Data Science, MS in DS + X, joint programs (e.g., BA/MS, JD/PhD, ...), certificate programs

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

- **Algorithms**
  - 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

- **Programming**

- **Mathematics**

- **Experiential**

**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 at a Glance: Faculty Growth & Areas

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

2. **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.
   - Cognitive Computing: Mechanism Design, Meta Learning, Explainable/Fair ML, NLP, HCI, etc.

3. **CDS Foundations:** Theoretical research at the interface of algorithms, information theory, optimization, mathematics, and statistics. Examples:
   - Computing at Scale: Streaming/Sublinear-time algorithms, compressive sensing, etc.
   - Learning Theory: Federated learning, causal inference, scientific ML, information theoretic ML, etc.

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

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### CDS: Faculty Members – Core

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<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Department/Program</th>
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<tbody>
<tr>
<td>Kira Goldner</td>
<td>U Washington, CS</td>
<td>TT Assistant Professor Game Theory + Policy</td>
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<tr>
<td>Ngozi Okidegbe</td>
<td>Columbia Law</td>
<td>TT Assistant Professor Law &amp; Tech + Racial DS (joint with Law School)</td>
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<tr>
<td>Krzysztof Onak</td>
<td>MIT, EECS</td>
<td>TT Assistant Professor Big Data Algorithmics</td>
</tr>
<tr>
<td>Pawel Przytycki</td>
<td>Princeton, CS</td>
<td>TT Assistant Professor Computational Biology</td>
</tr>
<tr>
<td>Mayank Varia</td>
<td>MIT, Mathematics</td>
<td>Associate Professor Cryptography + Law</td>
</tr>
<tr>
<td>Tania Chatterjee</td>
<td>U Illinois Chicago, CS</td>
<td>Clinical Assistant Prof. Network Algorithms</td>
</tr>
<tr>
<td>Kevin Gold</td>
<td>Yale University, CS</td>
<td>Associate Prof. of the Practice Machine Learning &amp; AI</td>
</tr>
<tr>
<td>Langdon White</td>
<td>Siena College, CS</td>
<td>Clinical Assistant Prof. Software Engineering</td>
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CDS Hubs = Computing for Real-world Impact
Impact = Equity, Sustainability, Health, Civic Tech

PEOPLE:

Faculty
CDS founding + affiliated faculty (CDS expertise)

Students
PhD + Master’s + Undergrad students (work capacity)

Experts
Partners from BU and outside orgs (domain expertise)

ACTIVITIES & OUTPUTS:

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: Fellows

The CDS Civic Tech Fellows program amplifies the ongoing work and impact of faculty, postdoctoral researchers, and practicing experts at the intersection of technology and public interest.

Lei Guo (COM)
Gabe Kaptchuk (CS/CAS)
Michelle Johnson (COM)
Max Palmer (PoliSci/CAS)
Andrew Sellars (LAW)
Gianluca Stringhini (ECE/ENG)
Derry Wijaya (CS/CAS)
Brooke Williams (COM)
### Justice Media & Computational Journalism co-Lab

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

#### PARTNERS:
- WGBH
- The Boston Globe
- Banner
- LexisNexis
- The Intercept

#### 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 (AIEEM, WGBH, NAACP)

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### Powered by BU SPARK!

Building community, **supporting student-driven innovation and experiential learning opportunities in computing & data sciences**

1,900+ students **538** semester-long projects since 2017
CDS: Catalyst for Experiential Learning

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

CDS: Catalyst for New Industry Collaborations

MassMutual Donates $1 Million to BU’s Faculty of Computing & Data Sciences
Gift will fund a professor with real-world expertise, boost diversity efforts in the field, and award undergraduate stipends

We are pleased to announce a $1 million gift to the Boston University Computing & Data Sciences Center to hire a faculty member with real-world expertise, boost diversity efforts in the field, and award undergraduate stipends to students. Learn more: https://bostonuniversity.edu/
"Growing up with a single, immigrant mother who didn't speak English, I knew that I loved computers and technology, but was never able to actually know what the work would be like, or could even feel like I belonged, because no one in my family held a job like this. The [JM co-Lab project] I've worked on helped me not just grow my skills, but also catch up with my peers that perhaps had engineers in their families that they could look up to. I want you to know that you’re impacting the lives of students like me in ways that you can't imagine, so I felt like writing to you and expressing my heartfelt thanks."

Gonzalo Rosales (CAS'21 → Google)